ASPECTS OF THE PROSODIC SYSTEMS USED BY A SMALL GROUP OF NEW ZEALAND EUROPEAN CHILDREN AGED SEVEN AND EIGHT

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Mary L. Meikle

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ABSTRACT

This study describes aspects of the prosodic systems of intonation used by a small group of children. Twenty European children, ten boys and ten girls aged seven and eight in interview with an adult were used in the present study for prosodic analysis. The data were transcribed according to current methodology and the results were analysed using computer. In a series of crosstabulations the variables sex and age were held constant against the variables nuclear tone type, tone unit length, head length and presence, presence of the prehead, presence of the tail, pause length and pause position vis-a-vis the tone unit.

Analysis revealed several statistically significant differences between nuclear tone type and sex, nuclear tone type and tone unit length, nuclear tone type and presence of the tail, nuclear tone type and pause length and position, nuclear tone type and presence of the prehead, presence of the prehead and sex, tone unit length and sex, and pause length and position and sex. Descriptive information on each variable is also presented. An interpretation of the results is offered and limitations and implications of the present investigation are discussed.

CHAPTER I

1.1 INTRODUCTION

Intonation is a facet of language and communication which has traditionally received only cursory mention in many linguistic and educational studies. In recent years, however, intonation has been recognized as important to understanding language processes and consequently research in this area has increased. Some of this research still suffers from inconsistency in terminology, methodology and analysis. Although some of these problems are being rectified normative data is still lacking in many areas, especially children's intonation.

The present investigation is consequently an exploratory study which attempts to provide some information on aspects of the prosodic systems used by a small group of New Zealand European children. This chapter reviews those areas in the literature most pertinent to this study. Compromises were reached here, since time and space did not permit a full perusal of the works in this field.

Chapter two contains a description of the prosodic analysis employed as well as a brief outline of the statistical methods utilized. Simple statistics were employed since they were most appropriate for interpreting the data.

Chapter three presents the results of the analysis and provides a summary of them in the various tables.

Chapter four contains a summary and conclusions of the results, while the final Chapter examines the limitations of the present enquiry and proposes some areas for future research.

1.2 HISTORICAL REVIEW OF BRITISH AND AMERICAN INTONATION STUDIES

1.2.1 British studies

The first accounts of spoken English did not deal with intonation specifically but with speech production generally. John Hart's (1569) work is essentially a discussion on how punctuation marks in written English can be interpreted to ensure good speech production. Although factors like stress and rhythm were included, the work was highly subjective and prescriptive.

Butler (1633) similarly emphasised punctuation and looked briefly at the prosodic feature of tone. He linked the pitch movements of rises and falls in speech to punctuation and to certain grammatical contrasts. Hart's and Butler's work show some insights into intonation, but the study which excels during this period is Steele's (1775).

Steele's work was the first empirical study, detailing the existence of tonal contrasts in spoken English. He invented a method of intonation to transcribe pitch and stress; produced evidence to show that pitch changes occur in regular form upon syllables; he contrasted speech and music, concluding that the essential difference between the two was that music progressed by steps, while speech progressed by glides. Steele's work was of seminal importance to the study of intonation, but Pike (1945) maintains that Steele's transcriptional analysis based on musical units, was too inflexible a system to adequately describe speech. Pike asserts further, that Steele limited the usefulness of his study by only analysing pitch movements on single syllables, as opposed to stretches of speech. He was,

however, aware of the relationship between grammar,semantics, and intonation; his work was an early major contribution to this area.

Walker's (1787) work was principally theoretical. He linked intonation to grammar in English and developed a transcriptional analysis for detailing pitch movements in speech. His system suffered from inflexibility in that he also used musical notations.

Sweet (1878) presented the first of his works which marked a major departure from all previous studies. Sweet had had the benefit of a training in general phonetics which Crystal (1969) maintains, made him aware of the complexity of speech and the range of voice qualities making up intonation. Sweet's system of pitch contrasts has been used extensively since then and forms the basis of Crystal's own prosodic system, some part of which is utilized in this study (Chapter Two). Lieberman (1967) has also used Sweet's system in his own research, concluding that it is capable of transcribing speech with reasonable accuracy.

Daniel Jones' (1909) work, although empirically based still contained a limitation of the earlier studies. He used musical notation to describe speech. Jones attempted to transcribe the pitch movements of an individual speaker with the use of tuning forks, which was an attempt to transcribe in finer detail the speaker's pitch movements, but did so on single syllables and not stretches of speech.

Palmer (1922) is the first researcher to investigate prosodic features over stretches of speech. His and

subsequent studies mark a new departure in intonation research. Palmer took the sentence as the unit for analysis and broke it down into several parts, each part seen as contributing to the intonation of the whole sentence. He distinguished prosodic features such as the "nucleus", "head" and "tail". His important and influential study was followed by other linguists, including Kingdon (1939, 1958a) Schubiger (1935), Jassem (1952b) and O'Connor and Arnold (1961).

Armstrong and Ward (1926) produced an alternative transcription system, deliberately avoiding what they viewed as confusion and inconsistency surrounding earlier intonation studies. Their notational system was based on the minor work of Klinghardt (1923), which was designed to note primary contrastive features in speech.

From the early part of this century until the middle 1950's the study of intonation in Britain was largely confined to the work of Jones, Palmer, Armstrong and Ward. It was not until after World War II that research in this field was reinstituted. The studies cited were insightful for subsequent research because of their empirical basis. The teaching of English to foreigners after World War II rekindled interest in intonation. Textbooks appeared, containing examples of the intonation patterns necessary for mastery of spoken English.

Allen (1954) was one of the first to produce such a text. He emphasised intonation drills and a large part of his text was concerned with practise exercises. Later, similar pedagogical works were produced by Kingdon (1958a), who emphasised the function of intonation, O'Connor (1956),

Hill (1965) and Cook (1968). All these texts worked from a performance base and lacked a theoretical discussion. Some emphasis began to be placed on attitudinal and semantic functions of intonation, in addition to its relation to grammar. Theoretical works were written during this period by Lee (1956b &1956c), O'Connor (1951, 1952, 1955, 1957a), Arnold (1952), Hill (1956, 1957, 1960), Sharp (1958) and Trim (1959).

In recent years British linguists have concentrated on producing theoretical and empirical descriptions of intonation. Empirical studies have involved large quantities of data. This work has been conducted largely by Quirk (1960), Crystal and Quirk (1964), Quirk and Crystal (1966) Crystal and Davy (1969), Davy (1968), Davy and Quirk (1969), Crystal (1969) and Halliday (1963, 1964, 1966, 1967, 1975).

Quirk's system of intonation analysis was developed during his studies of spoken and written grammatical forms in modern, educated British English. It has been utilized and developed in all the studies above, Halliday's excepted. Since it is essentially the system employed, in part, in the present study it will not be explicated here. (See Chapter Two). Quirk's rationale for including an intonational analysis in what was primarily a grammatical survey was "...to ensure that no potentially, grammatically relevant prosodic phenomenon would be overlooked...."(1960, p 42). The data were analysed by computer to establish correlations between prosodic and grammatical features.

Halliday employed intonational analysis in his studies where he saw it relevant to grammar. "...only those distinctions which are shown in grammatical description to be

meaningful are represented...."(1964, p 169). His system is similar to Quirk's and Crystal's but is not as comprehensive or as detailed. Crystal (1969) states that "The historical importance of Halliday's approach is to suggest a theoretical framework within which the different statements about intonational form and function can be related...."(p 44).

The current major British systems of intonation analysis are the system devised by Quirk and subsequently developed by Crystal and others,and the system provided by Halliday.

1.2.2. American studies

Rush's (1827) study was the first known study of spoken English in America. He presented a detailed paper on how to indicate pitch in speech, investigating also, voice qualities and certain vocal effects. He used a transcriptional system based on musical notation which Pike (1945) again found too inflexible. Scholars within America showed interest in Rush's work (Murdock (1884), Raymond (1910)), but the majority of studies were written by elocutionists. Crystal states that the elocutionists were interested in describing intonational features in spoken English only as such descriptions contributed to more "effective" speech production. They were primarily interested in reading written material aloud in the most entertaining manner possible and in delivering "polished" speeches.

Ripman (1922) produced the first major study of intonation after the period dominated by the elocutionists in the 1800's and early 1900's. He looked at pitch movements

over stretches of speech and devised a system for investigating pauses.

Bloomfield (1933) made the first phonemic analysis of intonation noting only distinctive segments of speech. He saw intonation, or more particularly pitch, as just one of the systems by which we communicate. "We use features of pitch very largely in the manner of gestures, as when we talk harshly, sneeringly, petulantly, caressingly, cheerfully, and so on." (p 114). Bloomfield's system distinguished eight phonemes for analysing intonation; five pitch and three stress.

Pike's (1944, 1945) extensive works in the phonemic analysis of intonation represents the present American system of analysis. His first work cited, consituted an attempt to list all sounds produced in the vocal tract. He looked primarily at features that occurred on single syllables, although some attention was paid to longer stretches of speech. Some of the vocal effects classified by Pike have been incorporated into Crystal's paralinguistic system. Pike was interested in speech sounds as noises and was not primarily concerned with their semantic functions. His subsequent and more influential work (1945) included fuller discussions of voice qualities. Pike now viewed intonation as attitudinal in function. This work contains a full description of his intonation system. He outlined four significant pitch levels, calling them pitch phonemes (as had Bloomfield) which served as the basis for his system. He maintained that these four levels were sufficient to deal with all differences in meaning existing in English. The concept of four levels as sufficient has been generally

agreed upon by other American scholars and those researchers in other countries using the phonemic approach. Pike's pitch phonemes are extra-high, high, mid and low and are numbered one to four respectively. He states that these pitch levels are relatively defined but that they are meaningless in isolation; the intonation contour provides the meaning. He correlated his four pitch levels to certain attitudinal features such as extra-high pitch denoting some element of surprise or unexpectedness. His system does not include classifying the pitch of every syllable "...but only those points in the contour crucial to the establishment of its characteristic rises and falls; these may be called contour points...."(p 26). He also detailed a system of pause and rhythm, maintaining that while these two features were intimately related to intonation contours they were to be kept distinct since in many ways they were independent of intonation and vice versa. Crystal states that Pike's 1945 work was "...the first really thorough description of the intonation system of any dialect of English." (p 47).

Independent of Pike, Bloch and Trager (1942) produced a work which attempted to integrate prosodic features into a phonetic framework. This work and Trager's (1949) own work has been used by researchers in other disciplines, notably writers in psychiatry and psychology.

Most works since Pike and Trager in America have been written by Bolinger (1946, 1947, 1948, 1949, 1951, 1952, 1954, 1955 a & b, 1957 a & b, 1958 a,b,c,d,e, 1959). Bolinger has discussed four aspects of intonation; the theory of intonation, the theory of pitch as a determiner of accent in English, neglected areas of intonation, e.g.

grammar, and intonation for non-specialists. He has criticised early studies for their lack of empirical analysis, noting that the majority of findings had been impressionistic, and that the system arrived at in American English, since it had not been verified empirically, was arbitary in parts. He states that the American system of intonation largely devised by Pike, which is based on pitch phonemes, is inadequate to deal with prosodic features in speech since intonational features are not as discrete as phonemes. The differentiation of intonation patterns, Bolinger argues, is a more continuous phenomenon than the differentiation of pitch phonemes, the range of prosodic features varying according to the degree of emotion expounded. Bolinger's most detailed criticisms appear in his 1949, 1951 and 1958a works.

1.2.3. Summary

The first studies in Britain and America by scholars such as Hart, Steele, Rush, Ripman and the elocutionists (albeit to a lesser degree) showed early, most of the basic problems associated with the study of intonation. Steele wrote that since intonation was complex it required a complex system of analysis. Such a system was not, however, achieved during this period. Serious consideration was not given to a wide range of prosodic features but was confined to two systems; tone (pitch movements) and stress. Crystal and Pike both state that the most unfortunate aspect of the work in this period was inconsistency in terminology. Scholars invented terms which were ill-defined, or not defined at all. As a consequence these early studies could

not be used collectively or contrastively. Although offering insights into some of the problems of defining intonation, early scholars did not lay down a ground base from which subsequent research could progress satisfactorily. O mond (1921) pointed to this lack of any established system. Although some important findings were made, a good deal of the work "...was made valueless by a thoroughly unscientific, prescriptivism, and impressionism, and a lack of definition of crucial descriptive terms." Crystal (1969 p 34).

Although the next period in British studies contained research with an empirical base, studies still lacked a complete framework for intonation. This continued until the early 1960's when large amounts of data were being analysed and bases for its analysis were being established. Crystal summarizes the period ending the late 1950's by stating that the main inadequacy was still a lack of comprehensive description of intonation. "The lack of any complete guide to intonation naturally resulted in a great deal of personal impressionism, and the making of vague frequency judgements...."(p 39). The heavy emphasis on pedagogical works had also delayed the presentation of theoretical aspects of intonation. The work of Bloomfield began the American system of intonation through the analysis of pitch phonemes. His work was the first major piece since Ripman's. Pike continued this type of analysis and through his later work produced the most complete system of analysis which is still used today. Bloch and Trager and Trager produced work in this area concentrating more on prosodic features and inte grating them into a system of intonation.

Most of the works in this period, as noted subsequently by Bolinger, had no empirical base,which,he concluded,made parts of the systems proposed arbitrary. Bolinger was critical of the phonemic base to the American system, concluding that the current analogies between the phonemic system and intonation were misleading and of limited use.

The system for analysing intonation in British English, as used today, was devised by Quirk in the 1960's and has been subsequently used and developed primarily by Quirk, Davy and Crystal in their own research and in research jointly undertaken. A full description of this phonetic system of analysis is provided in Crystal (1969) and parts of it in Chapter Two of this study. Halliday's system, developed around the same period, is also currently employed.

Two major systems of analysing intonation have been developed in Britain and America. The British model is a phonological approach which views intonation as comprising a set of systems, prosodic and paralinguistic. Analysis is based upon the division of utterances into functional units (tone units) within which prosodic and paralinguistic features occur. The American model is phonemic which views intonation as a series of pitch levels, usually four, with additional but separate systems of pause and rhythm.

Although both systems have inherent drawbacks, the British system has been used more in empirical research which has made it more comprehensive a system than the American one. Both models continue to suffer from a lack of theoretical principles upon which researchers can base their work. Although the two systems are opposed in their

systems of analysis "...the setting up of contours is the main aim common to both American and British approaches to intonation, though the theoretical status of the ultimate constituents of the contours differ." Crystal (p201).

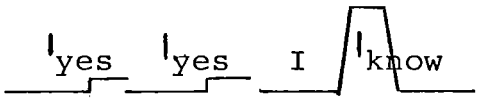
1.3 SEX DIFFERENCES

The relationship between sex and language has been variously studied for the last three hundred years. Brief accounts noting sex differences in language have been given for English (Mulcaster 1582), Carib and Arawakan (Breton 1665) Nootka (Sapir 1915) and German (Jespersen 1924) to name a few. However these studies were invariably confined to a generalized impressionistic discussion of female speech, calling it abnormal or at the least unusual (Key 1975). It was with the growth of sociolinguistics, as a separate discipline, in the 1960's that this area began to receive serious consideration, but it was with the advent of the women's movement in the late 1960's that the whole area of language and sex became of primary importance (Thorne and Henley 1975).

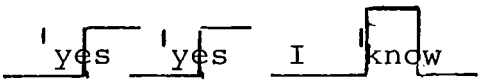
> "Current interest in sex as a sociolinguistic variable is the result of the convergence of two trends in social science research - emphasis on the social context of language and emphasis on sex as a social and behavioural variable. Understanding sex-based sociolinguistic variation may shed light on previously unanswered questions regarding conversational interaction, semantics, language acquisition, acculturation, socialization, mechanics of social control, and maintenance of group solidarity. Therefore the subject of language and sex is attracting researchers from a broad range of academic specializations." Bodine (1977,p104)

Sex differences in intonation have been studied primarily, if not exclusively, by women. Brend (1972)

began this investigation by noting certain differences in male and female patterns when teaching English to Russian teachers. She noticed that although the males in the group could adequately imitate her patterns they did not sound appropriate. She then examined American pitch patterns and noted definite preferences in the use of some patterns, and avoidance, by males, of others. "Certain ones seem to be completely lacking from mens' speech, while others are differently preferred by men and women..." (p85). Using Pike's(1945) terminology she showed the pitch patterns that only males use to convey "completeness" and "deliberateness":



She also showed the pattern that only women use, conveying incompleteness and politeness:



Brend claimed that the "unexpected" or "surprise" pattern is present in womens' speech but absent in males' and that only women used patterns reflecting hesitation, politeness, surprise, cheerfulness and unexpectedness. She further asserted that men do not use the highest level of pitch that women use and that men only have three pitch levels, while women have at least four. She cites Pike's (1945) reference to womens' use of a hesitation pattern which he claimed implied endearment. He referred to the pattern which ends in a rise, although a statement is being uttered, (terminal rise, see Chapter 2 for definition) as implying a feeling of needing more information from the hearer, or as expressing doubt on the speaker's part.

Lakoff (1973) continued this documentation of intonation patterns, looking more especially at the "incomplete" rising pattern on statements. She asserts:

> "There is a peculiar sentence intonation - pattern found in English, as far as I know only among women, which has the form of a declarative answer to a question, and is used as such, but has the rising inflection typical of a yes-no question, as well as being especially hesitant. The effect is as though one were seeking confirmation, though at the same time the speaker may be the only one who has the requisite information." (p55)

Lakoff maintained that this pattern was exclusive to women and that it reflected an unwillingness to assert an opinion. Its use conveys hesitancy and politeness "...leaving a decision open, not imposing your mind or views, or claims on anyone else." (p 56). This deference that women show, stems, Lakoff concluded, from a lack of power or authority. It reflects a perception by both sexes, of womens' inferior social and psychological status. She maintained that men do not use this pattern because they perceive themselves as socially and psychologically more powerful than women and use intonation patterns concomitant with such perceptions.

Key (1975) looked briefly at intonation patterns and sex. She maintained that no differences have ever been indicated which belonged exclusively to either sex, but that any differences were quantitative; that there was a preference for, or avoidance of, particular patterns. She claimed that many of the patterns which dominate womens' speech indicate emotional, expressive language. She

further maintained that they use a high pitch comparable to children's; used to reflect excitement. "That women do speak with more expressive intonational patterns has been noted by some pilot studies and observer linguists." (Key, p 72). She conducted her own small experiment where one of her students listened to children telling a story. She concluded: "The girls spoke with very expressive intonation, and the boys toned down the intonational features, even to the point of monotony, playing it cool." (p 72).

In summary, Brend, Lakoff and Key investigated intonation patterns in men and women. While their studies point to an interesting and important area, they suffer, with the exception of Key's small experiment, from a lack of empirical base. Impressionistic terminology is employed to describe the intonation patterns studied. Their claims can not be viewed as representing the patterns used by female or male, but must remain speculative. The criticisms that Bodine (1977) levels at Key's work are appropriate to Lakoff's and Brend's as well "...intuitionally-based suggestions, claims, hypotheses, and speculations of other scholars appear in Key's retelling as having been "shown" or "demonstrated", with no hint to the reader of their empirical base." (p 104).

These works are of value, since they initiated inquiry in this area and subsequent research has incorporated an empirical base. (Crosby and Nyquist (1977) and Edelsky (1979))

Crosby and Nyquist distinguish six characteristics of female spoken English, one characteristic being similar to Lakoff's; "...the question intonation in conjunction with declaratives." Crosby and Nyquist (p 314). Differing from

Lakoff who calls this particular pattern exclusively female, Crosby and Nyquist refer to it as part of the female "register" which they claim is also used by men. The use of such a pattern, they argue, reflects the female role in society; that of inferiority. They see the register as both expressive (e.g. polite rather than direct) and non-assertive. These two attributes are an integral part of the stereotyped female role.

Crosby and Nyquist looked at other aspects of language (vocabulary and syntax) but Edelsky's study concentrated on intonation, with a sample of over 100 adult males and female. Edelsky reviewed the previous work on language and sex and claims that it is not surprising to find a lack of sex differences in language use when theories are put to empirical tests, because "...in relation to certain lexical or syntactic variables at least, it is not sex differentiated language production which is accounting for women's continued inferior position. If production of certain language variables does not always reflect or perpetuate sex-assigned status, is it possible that these beliefs themselves (attitudes, interpretations, evaluations) surrounding these language variables may be the major reflectors/perpetuators?" (p 16). Eylan (1977) in her review of Lakoff's, Brend's and Key's studies made a similar statement, that the perception and interpretation of intonation depends upon the role or perceived role of the speaker. The purpose of Edelsky's study was two-fold: first, to investigate the "rise contour on declarative statements" (p 17) in terms of its frequency of occurrence for both sexes, and second, to determine what associations

are made by listeners to this and other patterns. In her study men and women were asked what their favourite colour was and where they were born, questions to which only they knew the answers.

Results revealed that the three tone types used were fall, terminal rise, and rise-fall-rise. Both sexes used the fall the most, in equal proportions. They also used the terminal rise equally but rarely. The rise-fall-rise tone was used by men equally in response to either sex of interviewer but women used it more in response to female interviewers. When listeners (male and female) were asked to attach attributes to the three tones used they attached stereotypic feminine attributes such as submissive and unassertive to female speakers, regardless of the tone, and male stereotypic attributes, such as aggressive, assertive, to males using the fall and rise-fall-rise tone but feminine attributes to males using the terminal rise.

Edelsky concludes that language attitudes reflect the dfiferential social status of the sexes. If the speakers could be identified as female, she states that they were rated as less desirable and assigned low status attributes. She maintains therefore, that it is listeners' attitudes, not speakers intonation patterns that are important. "It is not necessarily true then, that female speakers use of language always reflects and perpetuates their lesser status but that their lesser status is reflected in listeners attitudes towards female speakers." (p. 31). Although her explanation accounts for why females are labelled with feminine attributes, whatever patterns they use, it does not account for why those attributes were assigned to males only

when they used the terminal rise tone.

An investigation of this tone's use is one of the purposes of the present study since its occurrence has been noted in New Zealand English only in an informal way by Davy (1978). "Usually, when I make a statement, and have nothing more to say, I use a falling pitch movement. But I'm often hearing New Zealanders use a rising intonation pattern on a statement that they intend to be final...I tend to interpret that final rise as meaning that there is something more to say..." (p4)[1]. Distribution, frequency of occurrence, and possible meaning of the terminal rise have been investigated in Chapter 3.

In conclusion, Lakoff, Brend and Key investigated sex differences in language and more particularly, intonation. Although their work investigates an important area their findings have been largely based upon introspection and intuition. Crosby and Nyquist began the first empirically based studies, and this was followed by Edelsky's study. The intonation pattern investigated in these studies which is of particular interest in the present study is that containing the terminal rise.

1 Davy, D. (1978) "Some Basics of language". Radio Broadcast, Christchurch, New Zealand.

1.4 · PAUSE

Some early references exist regarding pause by such scholars as Steel, Sweet and Walker, but no major investigations were undertaken until this century.

Hedegüs' (1953) work is one of the earliest empirical studies of pause. He reviewed the existing works in Britain and Hungary and presents findings from his own research.[1] He outlined a generally accepted theory on pause at the time which stated that pausing occurs when breathing in, since taking in breath is a primary biological necessity and that such a necessity has become attached to speaking with the process of evolution. Hedegüs took this another step by adding that pauses also occur while breathing out i.e. speaking and showed from his own research that such pauses are designed to promote understanding and to facilitate social intercourse. He sought evidence for the existance of these pauses as far back as Greek scripts which used punctuation features to indicate pauses.

Hedegüs used spontaneous Hungarian speech and written material read aloud for analysis of pause. From this analysis he distinguishes two lengths of pause short and long, measuring them in one hundredths of a second. Short pauses being on average forty-six hundredths of a second long and long pauses being on average one to one and a half seconds long. Over the two speech mediums short pauses remained constant in length, whereas long pauses in reading were usually one second in length, and one and a half seconds in spontaneous speech. In spontaneous speech Hedegüs located short pauses

within utterances and long pauses at their boundaries. Pauses due to hesitations, which Hedegüs maintained were unintentional, were of either length. In material read aloud, pauses, short and long, were located at the ends of sentences, and before connecting parts of sentences. Hedegüs concludes that while there may be differences between individuals, the pauses used follow patterns speakers have learnt in their speech community. "It is clear, therefore, that apart from divergences between individuals, the pauses of speech are to be considered as an expressive quality of historically determined value". (p.19).

Hedegüs is critical of some of the earlier works on pause stating that spontaneous speech was not used, analysis generally being confined to a single utterance, written or spoken, from which he maintains an adequate description of the use of pause is not possible. His work is of significance as an early study because of its empirical base and detailed analysis of data.

Lounsbury (1954) examined pause in the spontaneous speech of adults. He hypothesized that short pauses, less than one hundredth of a second, would occur between more familiar words and phrases, while long pauses, more than one hundredth of a second, would occur between less familiar words. From analysis of the data he found this to be correct, concluding that longer pauses indicated a longer thought process. He classified pause as either junctural, occurring at the ends of utterances, or hesitation, occurring anywhere in the utterance, stating that the former were longer than the latter.

Maclay and Osgood (1959) conducted the next major work on pause, analysing the spontaneous speech of adults. They divided pause into two types; filled, minimal vocalizations such as ah, um,er, and unfilled, silence, and examined the occurrence of these types with various grammatical categories in the speech samples. They noted that both types occurred more frequently with lexical words, nouns, adjectives and verbs, than with function words, articles and prepositions. They also found that both types occurred more frequently at phrase boundaries than within phrases. This work sparked off the interest of other researchers including Goldman-Eisler.

Goldman-Eisler (1954, 1955, 1956 a&b, 1958 a&b, 1961 a,c&d, 1967, 1968 and 1972) has made an extensive study of pause. She began in the field of psychiatry, investigating the relationship between pause and body tension in psychiatric patients during interviews. (1954, 1955, 1956 a&b). Her later work examined pause in spontaneous speech and material read aloud. From an analysis of the former mode Goldman-Eisler (1958a) distinguished two pause types, one due to biological necessity i.e. breathing in and the other due to hesitation. The first type occupying from 2.5% to 25% of total speaking time and the second type occupying from 0% to 80% total speaking time. She noted that the breathing in pauses were mainly determined by the grammatical structure of the utterance and occurred exclusively at grammatical junctions whereas hesitation pauses occurred more randomly.

In her 1958b study Goldman-Eisler formulated her thesis based on Maclay & Osgood's work, that the frequency of occurrence of pauses is indicative of the amount of information in the words surrounding those pauses. Her data comprised spontaneous speech of two types, one, a group of adults describing cartoons and two, the same group attaching underlying meaning to the cartoons. In support of her thesis she noted that pauses occurred more frequently before lexical items of high informational content than before lexical items of low informational content, since the speaker had to choose from a wide range of words, requiring cessation of speech.

Goldman-Eisler's next work (1961a), using the data from the above study, was a comparative study of filled and unfilled pauses, plus an investigation of the individual consistency and psychological significance of both pause types. Analysis revealed that the ratio of filled to unfilled pause was an individual phenomenon, differing with each speaker. She maintained that the use of each type indicated different internal processes, "... cognitive activity being accompanied by an arrest of external activity (speech or non-linguistic vocal activity) for periods proportionate to the difficulty of the cognitive task, while emotional attitudes would be reflected in vocal activity of an instantaneous or explosive nature." (p25).

Goldman-Eisler found that those subjects who summarized their ideas more concisely hesitated longer with unfilled pauses, while those whose summaries were not concise hesitated longer with filled pauses. She concluded that

the former group were involved in higher level cognitive activity, therefore achieving superior stylistic and less predictable language formulations than the latter group who were involved in lower level cognitive activity, and therefore achieved inferior stylistic sequences of greater predictability.

In her 1961c work Goldman-Eisler reiterated the above points and added that "... initial delay in the production of speech accompanying verbal planning at a high level of cognitive activity, such as abstraction and generalization, pays off in the ultimate efficiency of the process of reproduction." (p231).

In her 1961d study the author investigated total pause time during speech, using material from psychiatric interviews and from the descriptions of cartoons. She noted that psychiatric interviews have a smaller proportion of short pauses, 50% less than one second, and a larger proportion of middle length pauses, up to 3 seconds, than cartoon descriptions, but they do not have the long pauses noted in the cartoon descriptions.

Goldman-Eisler further stated, that while pause frequency is dissimilar in these two situations "... interviews approach in the proportion of long pauses the most intellectual speech production, i.e. those requiring the highest level of verbal planning, while in frequency of pauses they are comparable to the most automatic speech products requiring least verbal planning". (p236). She concluded that a combination of long pauses followed by long utterances, found in psychiatric interviews indicated that the long pauses

did not reflect verbal planning but rather decision making, that is deciding whether to discuss "... contents which rise to the surface of consciousness in the course of the interview by virtue of its dynamics ..." She states, "The succession of a long pause by a long and fluent verbal sequence would indicate that the decision was one largely of whether to open the flood gates of surging material and to what extent to contain it rather than how to formulate it ..." (p231). Goldman-Eisler further states that statements structured by short pauses in a series of short phrases, more characteristic of cartoon descriptions, reflect lexical and structural planning.

Goldman Eisler (1967) investigated the sequential distribution of hesitation pauses in spontaneous speech, material read aloud. In both these modes she noted that pauses took up at least 30% of the total speaking time and that the rate of articulation was predominantly a function of pause time.

In her final work Goldman-Eisler (1972) examined the relationship between pauses, clauses and sentences and found that the majority of unfilled pauses occur at the ends of clauses and sentences, while filled ones can occur within these structures.

Bernstein (1962) investigated pause in relation to the two linguistic codes he had formulated: elaborated and restricted. He claimed that the elaborated code reflected a high level of cognitive activity while the restricted code reflected a low level, and that pauses occurred more frequently with high level cognition. Using the spontaneous

speech samples of working and middle class adolescent males Bernstein hypothesized that middle class males would hesitate more since they would use elaborated linguistic codes, and that the working class males who used restricted codes would hesitate less. Analysis of the data revealed that the working class males used a longer pause length, a shorter mean pause duration and a shorter word length than the middle class males. In conclusion, Bernstein stated that frequency of pause is an indication of the degree of monitoring behaviour that is occurring during speech and since the working group used pause less frequently than the middle class group their monitoring behaviour and cognition level was lower.

Levin and Silverman (1965) investigated hesitation phenomena in children's storytelling in two situations: to a group of adults and to a microphone while no one was listening. The following types of hesitations were defined: zero segregates (unfilled pauses less than one second in length) long pauses (unfilled pauses over one second in length) vocal segregates (filled pauses such as ah, er or um) corrections and repetitions. The authors suggest that hesitation phenomena may be the result of external stress manifesting as nervousness in the speaker.

Such a state may inhibit thinking ability hence the presence of hesitations. They further suggest that hesitations and fluencies may be an individual's style or a manifestation of self-monitoring verbal behaviour.

From factor analysis of these variables in the two situations the authors found that slow rate of speaking

was accompanied by a high rate of repetitions and corrections and that the more long pauses the fewer brief zero segregates (deliberate hesitations). In addition a high incidence of zero and vocal segregates was accompanied by a low incidence of corrections and repetitions. The authors called these latter two, stressful hesitations. The variable of exhibitionism [2] was included and correlated with the various hesitation phenomena. Analysis of these variables revealed that those children showing high exhibitionism pause for longer periods of time and used more deliberate hesitations than low exhibitionst children. Levin and Silverman offer two explanations for this; first that the former children use long pauses in order to extend their speaking time and to be impressive; second that conversely their pauses indicate stressfulness. Vocal and zero segregates showed no correlation with high exhibitionism, leading the authors to confirm that these hesitations indicate "... uncontrolled emotionally under stress." (p82). The authors also noted more zero and vocal segregates in the group situation than in the solitary situation. They concluded by stating that stressful hesitations are influenced by the situation in which the child is speaking. The group or public situation is more stressful for the child and this leads to proportionately more zero and vocal segregates than in the solitary or private situation. The deliberate hesitations, corrections and repetitions, are predicted from the degree of exhibitionism the child manifests. This study is of particular importance since it is the first involving children as subjects.

Tosi, Singh and Takefuta (1966) conducted a cross-cultural study of unfilled pauses in oral reading with three groups of children speaking their native language, Japanese, Spanish and Hindu respectively and their second language, English. Half of these children spoke English fluently and half did not. However an analysis of the speech samples revealed that there was no difference in length or duration of pauses that the subjects used in their native language or English.

Martin (1970) examined pause phenomena to establish "... some grammatical and acoustic correlates of unfilled pauses, to compare listener judgements against physical masures and to suggest that for many purposes the latter are often superfluous." (p75). Using sixty utterances from adult subjects the author used two scorers to independently locate four types of pause but only unfilled pauses have been reported from the study. These utterances were also analysed for pauses over fifty milliseconds long using a spectrograph. Pauses at grammatical junctures (clause, phrase or sentence boundaries) were detailed.

Analysis revealed that in terms of overlap, agreement between scorers over pause location was 91.5%. The overlap for scorer and spectrograph agreement was 90.0%. Scorers also recorded pauses when there was no actual silence, but a perceptible slowing done by the speaker then a speeding up again and did not record pause when there was a pause. The author concluded from this that short preceding syllables suppressed pause judgment at grammatical junctures while long preceding syllables induced pause judgments even though

grammatical junctures cues were absent. Therefore syllable length was isolated as an important cue to the perception of pauses. "Elongated syllables usually accompany and precede judged-pause locations whether or not a silent interval is present, but these locations also are usually grammatical junctures. However, elongated syllables appear to cue pause judgements independently of grammatical cues. Finally, since the extended syllables which listeners hear as unfilled pauses are logically as good an indicator of hesitation as other measures ... listener judgment seems preferable to physical recordings...". (p77).

Hawkins (1971) investigated the relationship between unfilled pause location and syntactic structures in the spontaneous speech of working class and middle class children. Pause location was determined by the grammatical function of the word immediately following a pause. Hawkins found that pauses occurred in six locations, five at the beginning of a clause and one within a clause. The author suggests that pausing indicates speech planning, the thesis of many of the researchers above. Since pauses occurred mainly at clause beginnings and boundaries Hawkins concluded that this is where most speech planning occurs. "The high frequency of pauses at clause-boundaries thus reflects the wide range of options which confront the speaker at that point. Decisions of many kinds have to be made - of content, of syntactic structure, of information distribution." (p287).

Dale (1974) investigated hesitation phenomena in maternal speech. From an analysis of spontaneous speech that mothers used in talking to babies, Dale found that

filled and unfilled pauses occurred more frequently at sentence boundaries than within sentences. He stated that this location was a significant source of segmentation information concerning the syntactic structure of sentences and that mothers used these patterns consciously when talking to babies.

Kowal, O'Connell and Sabin (1975) investigated pause in the spontaneous speech samples of a group of children and adolescents. The authors view pause phenomena as "... behaviour which is synchronous with, and indicative of, encoding processes responsible for the generation of information." (p51). Analysis of the speech samples revealed the following. Younger subjects used more unfilled pauses and shorter utterance lengths than older subjects indicating that younger subjects need more time to plan. 80.0% of all short unfilled pauses occurred before function words while the longest pauses occurred before nouns, including proper names. The authors claim that this pattern indicates that it takes more time to select a specific word than it does to choose one from a group of possibilities. In conclusion Kowan et al. state "Linguistic skills related to the use of more or less complex structural verbal patterns are assumed to be reflected in the frequency of unfilled pauses". (p205).

Butterworth (1975) conducted a study involving hesitation and semantic planning in speech. From analysis of the spontaneous speech samples of adults males Butterworth presents two general findings. One, that the relationship between syntactic boundaries and pause is not

random but rather associated with planning speech sequences. Two, that pauses are used to divide speech into units in order to facilitate its comprehensibility.

Henderson and Nelms (1976) examined pause and nuclear tone in speech to establish which of these prosodic systems provided more information regarding the segmentation of speech into units. A group of English speaking adults listened to these features in recordings of Czechoslovakian speech. Analysis of listeners responses revealed that nuclear tone, especially a falling tone, not pause was of more use in perceiving speech segmentation.

In summary, Hedegüs presents one of the earliest studies empirically investigating only pause. He investigated short and long pauses in oral reading and spontaneous Hungarian speech. He claimed that pause patterns were culturally determined. Lounsbury investigated short and long in various locations of utterances. Maclay and Osgood divided pauses into filled or unfilled categories and correlated each type with various features.

Goldman-Eisler has made an extensive study of filled and unfilled pauses. From these studies she concluded the following. The frequency of pauses indicates the amount of information in the words surrounding the pauses. Pauses occur more frequently before lexical items of low informational content than before items of high information content because the speaker has to choose from a wide range of words, necessitating more cessations of speech. Filled and unfilled pauses reflect different internal processes;

filled showing emotional attitudes and unfilled, verbal planning. Subjects who used more unfilled pauses presented more concise speeches than those subjects who used more filled pauses. Psychiatric subjects used more short pauses, while normal subjects used more long pauses.

Bernstein investigated pause behaviour in working class and middle class subjects whom he stated used restricted and elaborated linguistic codes respectively. Middle class subjects used more pauses than working class subjects, reflecting higher cognitive functioning in the former group. Levin and Silverman investigated various types of filled and unfilled pauses in children's speech. The authors suggest that hesitations may be a matter of individual differences or a reflection of self-monitoring verbal behaviour. They also state that pauses may reflect stress. They found that the type of pause used depended upon the situation involved.

Tosi, Singh,and Takefuta investigated pause in children's native language and their second language, English. They found that pause length and frequency of pause did not differ between the native language and English. Martin examined pause using a spectrograph as well as two listeners. He concluded that listeners perception of pause was preferable to using a spectrograph. Hawkins examined pause in relation to syntactic structures and found that most pauses occurred at grammatical junctures where linguistic decisions were being made.

Dale investigated pause in maternal speech. He found that pauses were deliberately placed at sentence boundaries

in order to facilitate the perception of the segmentation of speech. Kowal, O'Connel and Sabin examined pause in the speech of children and adolescents and found that younger children used more unfilled pauses than older children since the former needed more time to plan their speech. Butterworth, in examining pause and semantic planning concluded that the relationship between these two variables was not random and that pauses facilitated speech comprehensibility. Finally Henderson and Nelms investigated pause and tone to establish which prosodic feature provided more information to the listener regarding the segmentation of speech. They found that tone did, especially falling tones.

Footnotes

[1]Unless other stated all studies examined pause in English speech.

[2]Exhibitionism is indexed by a scale developed by Paivio et al. 1961. The scale is made up of 13 items to which the child responds by indicating whether each item is like them or not. Such items as: I like telling stories in front of the class, are included. Children responding affirmatively to such items score high on exhibitionism; children responding oppositely score low.

1.5 STUDIES IN CHILDREN'S INTONATION

Historically, children's intonation has been given minor consideration in studies of speech and language acquisition and development. It has been viewed as being of peripheral importance to emerging communication systems. Later research has gone some way towards indicating the vital role intonation plays in children's language but a great deal more work is still required before the complexities of intonation are fully recognized.

In early studies the problem of obtaining natural reliable spontaneous speech samples, plus the length of time involved in analyzing them, prevented research from progressing with speed. As a result this area has largely been ignored and many references to intonation have been vague, ill-defined and generalized and most studies have had no empirical validation. Normative information in this area is particularly lacking.

Crystal (1975) provides a comprehensive review of studies on intonation up to the mid 1970's. He states that while the early studies consisted of "... general melodic impressions obtained by listening to infant cries ..." (p.30) the more recent works now have a systematic, linguistic base. Crystal divides the existing studies into three main areas: prescientific investigations of the first year of life, parametric analysis of vocalizations of young infants and non-segmental patterning in older children.

Within the first group such researchers as Taine (1877), Darwin (1877), Hall (1891), Shinn (1900), Lewis (1936) and

Bar-adon and Leopold (1971) are cited as having investigated vocalizations of neonates and attempted to establish a developmental account of such vocalizations. While providing some framework and stimulation to other researchers Crystal summarizes these studies. "... the occasional insight is generally obscured by the unsystematic and scattered observations, the absence of anything which could be called methodology, the vague descriptions, and the flights of fancy". (p131). The importance of response to adults intonation patterns by babies, was of interest to some researchers in the early part of this century, including Hoyer and Hoyer (1924), Stern and Stern (1928), Delacroix (1934) and Pike (1949). They all recognized early discrimination of intonation as important to language acquisition and development. However, details regarding adult patterns, with the exception of Pike's study, are lacking. As a consequence only general statements can be expounded.

The second area of research Crystal reviews is parametric analysis of vocalizations of young infants. Researchers have cited the six to seven month period as the usual time when language-specific patterning begins. However there has been no work on the order of acquisition of such patterns within this time. Measurement of infant vocalizations has been possible since the 1940's with the advent of acoustic measuring devices. The spectrograph has been employed by such researchers as Lynip (1951) and Winitz (1960). Phonophotography has been employed in studies by Fairbanks (1942, 1950). Kymography has been employed by Dittrichová and Lápačková (1964) in their work on infant vocalizations.

A roentgen and cinefluorographic study was undertaken by Bosma and Fletcher (1961) and a panoramic sonic analyser was used by Fisichelli and Karelitz (1963) to analyse infant vocalizations. The most detailed acoustic description in this area has been completed by Wolff (1959). Wolff differentiated five types of crying in babies; anger, pain, frustation, a fake cry and a cry indicating gastro-intestinal discomfort. From his extensive study Wolff concluded that vocalizations, crying and noncrying, were systematic, differentiated and expressive.

Research has been conducted on the crying behaviour of deaf and normal infants in order to provide normative information, useful in screening neonates for early detection of deafness. Such researchers as Ling (1965), Luchsinger and Arnold (1965) Lenneberg et al. (1965) and Jones (1971) have investigated this area. According to Luschsinger and Arnold, the crying pattern of a deaf baby is "... melodically distorted, more screeching and less emotionally differentiated than in normal children." (p348).

In summarizing the studies completed in this second area (parametric analysis of vocalizations) Crystal makes the following points. First, that much of the research has not examined the qualitative characteristics of vocalizations, but rather their frequency of occurrence. Second that spectrographic techniques will need a high degree of automation before being of significant use, since only by automation can large volumes of data be processed, enabling normative material to accumulate.

The final area of research reviewed is non-segmented patterning in children from the second half of their first year, onwards. Crystal presents his own research findings, outlining a developmental sequence for non-segmental patterning, comprising three stages. First, a prelinguistic stage comprising biologically determined vocalizations plus innately determined, differentiated vocalizations. This occurs from around six to seven months. Second, a period of more stable vocalizations where the infant uses specific tones, occurring from around seven to ten months. The third stage sees the beginnings of the primitive sentence occurring from about ten to eighteen months. Crystal states that when words are uttered in sequence as in this last stage tonicity, rhymicality, pause and tempo are the first prosodic and paralinguistic systems to appear[1]. By two and a half years the child is using a non-segmental system practically identical to adults.

Included in this final area of research is the relationship between intonation and syntax. Weir (1962) maintains that intonation is ontogenetically prior to the acquisition of syntax. Bever et al., (1965) and McNeil (1966) maintain the opposite view and state that grammatical structure determines the child's use of intonation. While these opposing views are equally supported, Crystal suggests that "All one can say is that there is evidence that the dominant perceptual component of the speech signal is non-segmental, and that some non-segmental patterns are understood and produced prior to anything conventionally syntactic." (p153).

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1 See Chapter Two for definition of these systems.

In the field of sociolinguistics, intonation patterns have been investigated in specific situations to determine what stylistically or socio-linguistically restricted linguistic behaviour children use. Lewis' work cited above contains some mention of distinct types of intonation but does not include details. Ervin-Tripp (1964) investigated children's play intonations, while Burling (1966) examined the metrics of children's verse. Carlson and Anisfeld (1969) investigated the intonation of jokes in a 2 year old subject. From investigations of children's intonation, Weeks (1971) concluded that children develop speech-registers. Brooks et al (1969) investigated the response to tone on positive and negative words, e.g. good, bad, in a group of middle and lower class boys. While the middle class boys did not show any preference to the words with and without inflection, the lower class boys showed preference to those words with inflection, showing that they responded more to the intonation than the word.

Intonation and intelligence has been investigated sporadically over the years. Cameron et al. (1967) found that the age at which female babies begin to babble (early intonation) is predictive of later intelligence scores. Seligman et al. (1970) have conducted research on children's intonation noting that the prosodic features children use unconsciously affects teachers' evaluations of their intelligence and capabilities.

Crystal summarizes the research in this area by pointing to two major areas still to be undertaken. One is the establishment of normative data. Information is lacking

on: the physical properties of nonsegmental patterns, changes in vocal behaviour, individual differences between children, socio-economic variations among children, the range of determinants which affect vocal behaviour, the norms of adult speech which elicit children's vocal behaviour, and the period of emergence of the affective, syntactic and social functions of the various intonation patterns. The other area is the establishment of consistent, reliable methodologies which requires one, adequate descriptive frameworks, incorporating articulatory, acoustic and auditory dimmensions of analysis and two, correlations of acoustic/ articulatory and auditory information.

In summary, research on children's intonation has traditionally been of secondary importance to the study of language acquisition and development. Intonation patterns have been given general mention only and comments have often been vague, ill-defined and sometimes misleading. Early studies suffered from a lack of empirical data and therefore a lack of systematic analysis of speech samples. Crystal's review of existing work separates the research into three areas: prescientific investigations, parametric analysis of vocalizations and nonsegmental patterning in older children. Research in each area is cited, together with an appraisal of its contribution to the study of intonation. Crystal concludes, "As Lewis (1936:95) said: "The whole question of intonation in children's speech is ... extremely obscure". It is depressing, nearly forty years later, still to have to agree with him." (p.158).

CHAPTER II

METHOD

2.1 INTRODUCTION

This chapter contains a description of the sample, the data collection and the methods of analysis employed. A prosodic analysis was utilized, based on Crystal's (1969) work. A description of his prosodic analysis has had to be gleaned from his writings since he does not present it in a discrete unit but refers to it throughout all sections of his book. This chapter concludes with a description of the statistical analyses employed in the present study.

2.2 SUBJECTS

The subjects used in this study were 20 European New Zealand children from Christchurch, 10 boys and 10 girls between the age of seven and eight years. These children formed part of a larger group used in a doctoral study by Moynihan (1979)[1]. Moynihan believes her sample to be of general average ability. However this belief can not be accepted unquestioningly since her criterion was teacher judgements of the children's performance in class. She then cross-checked these judgments against the children's school record cards. These 20 children all spoke English as a first language and with reference to school records were said to have no significant disabilities with speech or hearing, but since Moynihan does not clarify "significant disabilities" this can not be accepted unquestioningly.

Moynihan describes her sample as children from a middle socioeconomic background based upon father's occupation or mother's if the mother was the single parent. She states this was fairly broadly defined to exclude only the top professional levels and the unskilled workers. The parent's occupation was graded according to the Elley and Irving socio-economic Index (1976)$_2$ and obtained a mean ratio of 2.93.

2.3 DATA COLLECTION

In Moynihan's study all subjects were initially asked a series of questions about themselves, their families and their school. This aspect of the interview situation occupied approximately a quarter of the session. The major portion was spent with the subjects talking about picture cards that they had been given to look at. The cards consisted of sets, each of which told a story in sequence. Each subject was first presented with the final card of the sequence and was asked to talk about what might happen next. After this, the penultimate card was presented until the child had told its version of the whole story. Each session lasted approximately 30 minutes and was recorded on tape. Moynihan analysed each subject's utterances, examining various syntactic elements, using a method of analysis developed by Lee (1974).

2.4 PROCEDURE

The tape-recorded speech utterances of these children were used here for prosodic analysis employing the method

presented in crystal (see section 2.5). These utterances were used since it was convenient for the author of this study to use data already collected. Also the topics of discourse were similar for each subject, which Crystal states is essential in order to generalize about the group as a whole. The primary data consisted of approximately 10 hours speaking time. Crystal maintains that a period of three hours speaking time is an adequate length for analysis since the whole range of prosodic features would occur in that time. Transcribing the speech utterances, checking them and then having them checked by an independent transcriber took over 150 hours to complete. The transcribed prosodic features were then analysed using S.P.S.S. (1979).

2.5 METHODOLOGY

2.5.1 Introduction

Prosodic and paralinguistic features occur in connected speech in various combinations and together constitute what is known as intonation. Intonation is often translated as "tone of voice" which, although a familiar term, conveys little of the specifics of intonation. A traditional view of intonation is, that it signals the speaker's attitude towards what they are saying or towards some part of the context in which they are saying it. This view also suffers from generality and does not present a very specific picture of the factors involved in intonation. Crystal states that intonation patterns need to be formally analysed, since they "...deal so closely with personal attitudes often imprecisely definable by introspection, and difficult to measure and assess...." (p.7). Crystal goes some way to fulfill the need

for specificity, with his grouping of intonation into systems of prosodic and paralinguistic features.

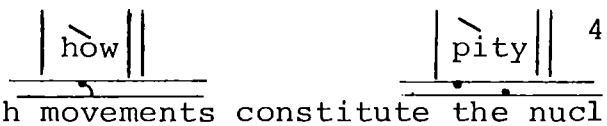
Phonetically, prosodic features can be defined as vocal effects constituted by variations of pitch, loudness, duration and silence. These features Crystal states have "...a primary (but not identifying) relationship with the physical dimensions of fundamental frequency, amplitude and time respectively." (pp5-6). This definition excludes vocal effects which are primarily the result of physiological mechanisms other than the vocal cords, such as the result of movements of the pharyngeal, oral or nasal cavities; such vocal effects are referred to as paralinguistic features. "Paralinguistic features are phonetically less discrete and allow more idiosyncratic variation than prosodic features... they are also phonetically discontinuous in connected speech whereas exponents of pitch, loudness and duration are always present." (Crystal p. 128). Whisper, giggle, sob and breathiness would be examples of paralinguistic features, a comprehensive range is provided in Crystal (1969, pp 132-140). Paralinguistic features were not investigated in the present study, therefore a detailed account of them will not be given here.

2.5.2 Prosodic systems

Two of Crystal's prosodic systems have been utilized in the present study and some description of them is presented here. Prosodic analysis of connected speech defines any linguistic contrasts that are occurring. Crystal maintains, for instance, that if prosodic features are imperfectly learnt a foreign language can not be fully mastered. From this viewpoint prosodic features are considered more

important than paralinguistic ones. It is the interaction of features from the various prosodic systems which constitute the bigger part of intonation. Prosodic systems which Crystal outlines are: tone, pitch-range, tempo, loudness, rhythmicality and pause. Tension is also included as a prosodic system, but not exclusively since it is also included as a paralinguistic system. Of the seven systems, two; tone and pause have been investigated in the data of this study. (For a full discussion of the other prosodic systems see Crystal, 1969).

2.5.2.1 Tone. Crystal's tone system covers what has been called by other linguists "kinetic" or "dynamic" nuclearity, Kingdon (1958a) and O'Connor and Arnold (1961). Tone deals with the direction of a pitch movement within the most prominent syllable of a stretch of speech defined as the tone unit. Crystal defines the tone unit as "...the most readily perceivable, recurrent, maximally functional unit to which linguistic meaning can be attached..." (p 204)[3] Within a tone unit the nucleus or nuclear tone is the only obligatory element Crystal maintainsthat in any tone unit "...the majority of syllables are uttered with a level pitch ("static" tones) but a few are uttered with a perceptible pitch movement from one height to another..." (p 142). He states that this movement can be a pitch glide, for example when the syllable centre contains a relatively long vowel, or vowel-like sound. The pitch movement could also be a pitch jump to a different level on the following syllable, for example, when the syllable contains a short vowel and there are other syllables in the word. Both examples below constitute a pitch fall; the first a glide, the second a jump.



Thus pitch movements constitute the nuclear tone. At least one such tone is obligatory for a tone unit to be interpreted as complete. The nuclear tone occurs on a syllable or syllables, known as the nucleus.

Crystal distinguishes three categories of tone; simple, complex and compound.

Simple tones involve a "...unidirectional pitch movement, rising, falling and level, the centre of prominence being at the beginning of the glide." (Crystal, p 211). In addition to Crystal's three simple tones it has been found necessary to include what has been termed the "terminal rise" tone. This tone has been added to describe a particular prosodic feature of New Zealand English. This tone, while perceived similarly to the existing rising tone, (albeit somewhat wider than most rises), appears to express a different semantic or attitudinal function. Whereas, in general, the rise has an interrogative expectant or continuative function; ie asking questions or listing things, the terminal rise has been used in some of the utterances, from the speech samples used in this study, in a similar way to a falling tone. Both the fall and terminal rise tone are used to make statements and replies to questions asked and, unlike the usual rising tone, are not used to ask questions or to indicate continuation. The terminal rise tone indicates termination, hence the name terminal rise. A typical example from the data follows. (the subject is looking at picture cards).

(a) examiner: |what has 'happened there || do you |think ||
subject: — he's | popped the handkerchief ||

(b) examiner: now |there's the whole 'story|| would
you |like to 'change your mind ||
subject: um - they were |blowing a·balloon ||

(c) examiner: |yes ||
subject: – and he was |blowing bubble'gum || . and
he |blew it ||and he -- and it |popped ||
and it |went all 'over his face ||

These examples indicate that the terminal rise tone can be used in a single tone unit, or in a sequence during discourse. In the last sequence, (c), this tone is used in the first and last tone units and in both cases no sense of continuation is communicated. What, then, is the speaker really conveying by using the terminal rise? It is currently thought that the speaker is conveying uncertainty and hesitation and by conveying such feelings, is seeking approval from his or her listener. Since this tone has, with the exception of the present study, not been investigated empirically in New Zealand, descriptions of its meaning must remain speculative. The frequency of occurrence of this tone, its correlation with the sex of the speaker, and correlation with aspects of the tone unit and with the prosodic system of pause, as it occurs in the data, is examined in this study. Existing theories on the terminal rise are also examined in terms of this study's findings.

Crystal defines complex tones as "...all nuclei where there is a change in the direction of the pitch movement of a kinetic tone within a syllable, and only one maximum of prominence." (p 217). This category comprises the fall-rise and rise-fall as the two main types; in addition he includes

rise-fall-rise and fall-rise-fall, but these are much less commonly found. He states that the first element of the first two tones is phonetically more prominent than the second element and that the second element of the latter two tones is more prominent than the third. The former two tones only, are considered in this study, since the latter two did not occur.

Compound tones are binuclear tones; that is they are combinations of the kinetic tones and act as a single nucleus. Crystal outlines the fall-plus-rise and rise-plus-fall tones as the main two in this category. "The two elements of a complex tone have in effect been separated to allow for a larger stretch of utterance to fall under the semantic range of nucleus..." (Crystal, p 218). Where compound nuclei occur there must be no evidence of a tone unit boundary between the tones, that is, there is only one tone unit. The syllables between the two parts of the compound tone must show pitch continuation whether the pitch is a trough, for fall-plus-rise tones, or an arc, for rise-plus-fall tones. Crystal notes that some pitch variation between the compound nuclei is permissible but that the general tendency must remain. He also notes that one element of the compound tone, usually the first, must show more prominence than the other, otherwise there is a tendency to interpret the utterance as comprising two separate tone units. Although it is the first element which contains the prominence it is the second element which signals the major function and is the basis upon which the whole tone is classified.

For each of these three categories of tone; simple,

complex and compound, a subjective norm has been established in terms of the width of the pitch movement; this norm is not transcribed in the analysis. Deviations from this norm are transcribed as narrow or wide depending upon whether the pitch height is decreased or increased. Although the greater number of nuclear tones in the present study were "normal", a percentage of deviations occurred, sufficient to justify a separate analysis for comparative purposes (see section 2.6 for notational details).

Tonicity, or the location of the nuclear tone within a tone unit can be determined from syntactic features as well as from accentual features. When tonicity is established by accentual features, syntactic features may remain constant, while accentual features vary according to intention of the speaker. The following example shows how tonicity can be located variably:

"she was wearing a nice hat." The nuclear tone could feasibly be located on the words "she", "nice" or "hat", while the syntactic features remain constant. With the utterance:

"was she wearing a blue hat or a green hat?", there are no alternative options for locating the nucleus, which must be on the word "green". This is non-optional tonicity. This non-optional or grammatically determined tonicity occupies a minor role in tonicity overall, but its role is important. A discussion of the relationship of syntax to intonation should not, however, be restricted to tonicity; it is relevant to all prosodic systems. Crystal states "...it can be shown that a given grammatical structure has a regular correlation with a given intonation pattern and that a change in intonation causes one to assign a different

structural description to an utterance, no other morphological change being necessary. On this principle, one must expect degrees of grammatical function for intonation: some structures will be more restricted than others, and some intonation contrasts will be more frequently used for the purpose of making grammatical contrasts than others." (pp 254-255).

The nuclear tone is contained within the tone unit, which as defined above, is a stretch of speech which is the maximally functional unit to which a meaning is attached. The only obligatory element in the tone unit is the nuclear tone. After the nuclear tone, in a tone unit, either directly after or a few syllables or words after, there is a tone unit boundary which is indicated by two features. First a perceivable pitch change, and secondly by the presence of a junctural feature such as a pause. Other optional components of the tone unit are prehead or preonset, head and tail.

The prehead or preonset refers to any syllables which precede the first stressed syllable in the tone unit. It can comprise any numbers of unstressed syllables, in theory, but in practise usually comprises a few only.

The head is that portion of the tone unit which stretches from and includes the first stressed syllable, the onset, and extends as far as, but does not include the nuclear syllable(s). Although this is an optional feature of the tone unit it nevertheless occurs, in British English according to Crystal (1969), in high proportions. He notes that it is the most variable aspect of the tone unit and can comprise from one to 30 syllables. His research included an analysis of various head patterns that he had distinguished, the two major types being falling and rising heads. These

patterns were not investigated in the present study, so details will not be included here.

The tail of the tone unit comprises a number of syllables which follow the nuclear syllable. The tail is usually small in terms of the number of syllables it contains and is usually non-distinctive. Its pitch contour is automatically determined by the direction of the nuclear tone.

In summary, tone is one prosodic system presented by Crystal (1969), which has been investigated in the present study. Tone deals with the direction of the pitch movement on the nuclear syllable of the tone unit. This tone is known as the nuclear tone or nucleus. The nucleus is the only obligatory feature of the tone unit and must be present for the tone unit to be perceived as complete. The prehead, head and tail are the optional elements in the tone unit. Crystal distinguishes three categories of tone, simple, complex and compound. In the simple tone category the terminal rise tone has been added to describe a particular prosodic feature of New Zealand English. Tonicity, or location of the nucleus can be determined on syntactic or accentual grounds. The nucleus is the only obligatory element in the tone unit and as such is of primary importance to the study of intonation.

2.5.2.2 Pause. Pause, in addition to tone, is the other prosodic system investigated in this study. This system has been studied extensively as noted above (Chapter I). Of the two types of pauses outlined in that chapter; silent and filled, silent pauses were examined here. Crystal distinguishes four silent pauses on the basis of their relative lengths; brief, unit, double and treble pause. He

describes the unit pause as "...the interval of an individual's rhythm cycle from one prominent syllable (*arsis*) to the next, within a stable tempo..." (p171). Double and treble pause he describes as twice as long and at least three times as long as the unit pause repsectively. The brief pause Crystal has described as "...a silence perceivably shorter than (and usually approximately half as long) as the unit length" (p 171). Crystal notes that while brief, unit and double pauses are common in conversational speech treble pauses are not. He states that they are more frequently employed in monologue situations "...where the speaker knows he is unlikely to be interrupted and can thus make use of longer periods of silence for dramatic effect than normal." (p 171).

In the present study pause was also investigated in relation to the tone unit. Four positions were distinguished where pauses could occur. These positions are the "initial" position, the "inside" position, the "end" position and "before the next tone unit" position. The initial position is the silence that occurs immediately after the interviewer has finished speaking and before the subject begins. Crystal maintains that the pauses that occur here belong to the person about to speak and not to the person who has just finished. The inside position is the silence which occurs between the onset syllable and the tone unit boundary. The end position is the silence which occurs directly after the tone unit boundary and before any other utterance begins. Finally the before the next tone unit position is the silence which occurs between two tone units uttered by the same speaker, that can not be included by definition in the end

position. That is any silence that occurs after some unstressed syllables have been uttered but before the onset syllable of the next tone unit occurs.

In summary, pause is the other prosodic system besides tone to be investigated in this study. Pause length and pause position was analysed.

2.6 NOTATION

The notation system employed to transcribe the tape recorded speech utterances of the 20 children in this study was taken from Crystal (op cit). This system has been used and developed by Quirk et al (1964), Quirk and Crystal (1964) Davy (1968) Crystal and Davy (1969) as well as Crystal (1969). The system is designed to accommodate a typewriter keyboard as much as possible. The system was devised to allow large quantities of speech to be transcribed with a high degree of facility, involving the minimum number of symbols as possible. Crystal states, "The more important and frequent a prosodic feature, the simpler should be the notation used to refer to it (cf Crystal and Quirk (1964),p 57)" (p 15). The notation gives a clear graphic description which is easy to understand and use. For the purposes of this study only the notation of the tone and pause system and the tone unit will be explicated. For a full notation of all the prosodic and paralinguistic features see Crystal (1969).

The tone system divides tone into three categories, simple, complex and compound. Simple tones; the fall, rise and level are notated ╲, ╱ and — respectively. The terminal rise simple tone is notated ↗ . The two main complex tones; fall-rise and rise-fall are notated ╲╱ and ╱╲

respectively. The compound tones fall-plus-rise and rise-plus-fall are notated ＼+／ and ／ +＼ respectively. These symbols are placed above the vowel or vowel-like sound of the nuclear syllable or word.

The pause system distinguishes four lengths; brief, unit, double and treble pause. These are notated • , — , — —, and— — —respectively.

The tone unit beginning is indicated by a single vertical line; | , and the tone unit boundary is indicated by a double vertical line; ‖ . Any stressed, non-nuclear syllables in the tone unit are notated with a small verticle dash above the first letter of that syllable. Combining all these features, a typical tone unit is cited.

She's-she's | playing on the • ↗swing ‖

2.7 STATISTICAL ANALYSIS

Each subject's speech utterances were transcribed for prosodic features and divided into tone units. From each speech sample, 20 in total, 100 consecutive, complete tone units were used for analysis, each tone unit constituting one observation. A total of 2000 observations were used. For each subject the following variables were used; sex, age, tone unit length in words, nuclear tone type, head length in words, presence of the prehead in the tone unit, presence of the tail in the tone unit and the length of pause and position of pause vis-a-vis the tone unit. The first two variables of sex and age of the speaker were held constant for each subject's 100 observations.

The data were analysed in three areas. First, the nature of the relationship between any two variables in terms of the proportion and percentage of cases in each cell was examined by using crosstabulation analysis (S.P.S.S. 1979).

Second, the strength of the relationship between any two variables was considered. The measure used was Cramer's V. Cramer's V was chosen because the variables consist of discrete categories. Cramer's V is based upon the Chi squared statistic, from which traditional statistical significance can be ascertained.

Third, an indication of traditional statistical significance was considered. Since traditional statistical significance has so often been misunderstood and as a consequence misused, it is necessary to examine it in some detail. Since, in research, as well as in describing relationships in the sample of data, it is desirable to generalize across people, times, and situations, to underlying populations, the need for statistical inference arises.[5]

Traditional statistical inference allows the researcher to either reject, or fail to reject the null hypothesis at a certain confidence level (the null hypothesis states that there is no relationship between the variables being examined in the underlying population). Traditional tests of statistical significance assume that the errors involved in sampling are small. Hence there is little possibility that there could have been no relationship in the underlying

population. A lack of traditional statistical significance does not imply that there is no relationship in the underlying population, but rather that the sampling error is so large that there is uncertainty as to what the relationship is really like. However, the primary interest lies in the nature and strength of relationships in the underlying population which are not directly indicated by the level of statistical significance. For example, there is almost certainly a relationship between any variables considered and this can be verified empirically as long as enough data are collected. Therefore traditional statistical significance is not a good indication of the practical, linguistic or educational significance of the results of this study. Consequently statments about statistical significance in this study should be regarded as indicating the magnitude of error, in using the measures of the relationship in the sample, as estimates of the relationship in the underlying population. Such estimates can not be confidently made from this study since the population from which the subjects were drawn was not adequately described in Moynihan's study.

In summary, three areas of analysis were employed in the present study, the nature of the relationship between two variables, using crosstabulations, the strength of that relationship and an indication of statistical significance.

1 Moynihan's sample included 20 Samoan children whose second language was English.

2 This scale is based on the 1971 New Zealand Census.

3 The tone unit and its component parts is discussed in detail on page 50

4 The notation accompanying these two samples is explained in section 2.6.

5 Traditional statistical significance directly confronts the problem that the effects gained in a sample may be simply a product of sampling error.

CHAPTER III

RESULTS AND DISCUSSION

3.1 DISTRIBUTION OF NUCLEAR TONE TYPES

Previous research concerning the distribution of nuclear tone types, Quirk (1964), Davy (1968)[1] and Crystal (1969) shows that while some nuclear tone types occur in similar proportions across studies others do not. One such tone type which did occur in similar proportions through all three studies was the falling tone. It occurred approximately once in every two tone units used, proportions (recorded as percentages) as follows: Quirk 52.5%; Davy 58.7%, Crystal 51.2%. It was therefore expected that falling tones would occur in similar proportions in this study and analysis revealed that falling tones occurred in 47.3% of all tone units in the sample.[2]

Another tone type, occurring in similar proportions through the three studies, was the fall-rise, appearing 6.9%, 7.4% and 8.5% of the time respectively. It was similarly expected that this tone would show comparable proportions in the present study. Analysis revealed that it occurred in 7.4% of all tone units analysed, a result identical to Davy's.

The frequency of occurrence of the level nuclear tone varied among the three studies with 2.1%, 8.0% and 4.9% for Quirk, Davy and Crystal respectively. In the present study this tone type occurred in 15.3% of all tone units. One possible reason for this high occurrence is proposed. The three studies cited contained conversational speech between

at least two people, involving speaking in turn, in more or less equal proportions. The stretches of speech in the present study are basically monologues. Subjects were given brief instructions, or were asked brief questions, then spoke for relatively long sequences with little interruption and only minimal responses from the interviewer. This latter factor, together with the sequenced nature of the material (see Chapter 2: Method) possibly predisposed subjects to stringing their utterances together; continuation being indicated by the use of level tones, hence its higher occurrence than in the studies reported.

Since the subjects were answering, rather than asking questions and since the percentage of level tones being used to express continuation was higher, it was therefore expected that the rising nuclear tone (used mainly to ask questions or to indicate continuation) would occur in smaller proportions than in the three studies above. The ipsative nature of the data also leads to this expectation. Analysis showed these expectations to be the case: the rising tone was used in 3.0% of all tone units compared to its use in the above studies; 24.7%; 16.1% and 20.8% respectively.

The proportions in which the terminal rise tone occurs in New Zealand English have not been formally documented to date. Its existence has been expressed as a subjective opinion by Davy (1978) and by others, in personal communication with the author of this study, who see it as an undesirable reflection of national unassertiveness. These "others" claim that adult New Zealanders use it a large percentage of the time and that the percentage is increasing in the child population. Analysis in this study showed that

the terminal rise was used in 24.6% of all tone units: approximately one in four tone units contained this nuclear tone. This high percentage, combined with the percentage of falling tones used, accounts for 71.9% of all tones used. With the fall-rise, the level and the rising tone 97.6% of all tone units analysed have been accounted for.

The following tone types which occurred in relatively small proportions in the three studies above, occurred in even smaller proportions in this study which was expected since over 90% of the nuclear tone types have been accounted for. The fall-plus-rise tone occurred 1.5%, the rise-fall 0.7% and the rise-plus-fall tone 0.2%.

Comparison between this study's results and those of the three studies quoted, is presented in table 3.1[3]

3.2 CROSSTABULATION ANALYSIS OF NUCLEAR TONE TYPE BY SEX OF SPEAKER

A crosstabluation analysis was conducted in order to investigate whether sex differences exist in the use of nuclear tones. Previous studies have stated that differences exist and that some tones and intonation patterns are used exclusively by women, especially the terminal rise pattern (Brend (1972), Lakoff (1973) and Key (1975)). Subsequent research has fowarded a different analysis. Crosby and Nyquist (1977) maintain that women have a female "register" but that males use it as well. Edelsky (1979) showed from her experiment that males and females used nuclear tones equally including the terminal rise, but that men who used this tone were attributed "feminine" qualities. (see Chapter I for a full discussion of these studies'findings.)

In this study the terminal rise was used in 24.6% of all tone units. A crosstabulation analysis of nuclear tone type by sex of the speaker revealed that boys accounted for slightly over half of the terminal rises use, while girls accounted for slightly under half, with 51.6% and 48.4% respectively. These results are contrary to the statements made by Brend, Lakoff and Key, but support the findings of Crosby and Nyquist and Edelsky. The following is a speculative discussion of the reasons for the use of the terminal rise.

Given that the terminal rise is used to reflect hesitancy, uncertainty and possibly feelings of inadequacy and lack of confidence, as has been proposed, these results suggest that both sexes experienced these feelings comparably since they used the terminal rise in similar proportions. Lakoff's assertions that this pattern is used exclusively by women, because they are dominated by men, can be accepted in part by stating that this pattern is used by whoever feels a lack of confidence or feels dominated in the communicative situation. Speculatively, the subjects in this study may have felt dominated because they were children and the interviewer was an adult. It might be said that adults "dominate" children through their greater size and age and that advantages of size and age additionally confer psychological dominance and authority. Such an analysis is similar to Lakoff's analysis of male and female intonation differences, but Lakoff's perspective is too narrow in its pinpointing of women as the only dominated group in society. While Edelsky's analysis shows that men and women use this pattern equally, albeit rarely, she does not offer any explanation

for its use but does state that it is perceived by male and female listeners as "feminine" even when used by males because they believe it reflects weakness and unassertiveness; feminine/female characteristics.

One of the limitations of the studies cited is that the population involved, comprised adults only. Another limitation is that a very narrow range of communicative situations were used. As a consequence the findings can not necessarily be generalised to an underlying population.

It is still not currently known, for instance, whether the terminal rise tone is used in natural settings[4] among groups of the same and opposite sex, of the same and different socio-economic status, of the same and different age, groups of the same and different race and among groups of friends and strangers. Such factors would need to be investigated in situations comprising adults only, children only and adults and children together.

The use of the terminal rise in this study may not be representative for the above reasons and also because the children knew they were being recorded. In addition the setting in which the utterances were elicited was highly artificial and the interviewer was a stranger. Since no other normative data exist on the use of terminal rise tones among children, these findings must be seen as a product of a particular interview situation, and not as a general indication of the tone types used in the New Zealand child population.

Further analysis showed that of the 47.3% of tone units containing a falling tone, girls accounted for 50.5% and boys 49.5%. Of the 15.3% of level tone units, girls

and boys accounted for 50.3% and 49.7% respectively. The fall-rise was used in 7.4% of all tone units, girls accounted for 65.7%, boys 34.3%.

The over-all strength of the relationship between nuclear tone type and sex of speaker over the entire sample is indicated by Cramer's V and equalled .14. These results are statistically significant at the .01 level of confidence[5] (table 3.4).

3.3 ANALYSIS OF TONE UNIT LENGTH IN WORDS

In previous research, Crystal (1969), tone unit length in words was examined. Results revealed that, on average, tone units were five words long. This result was compared to tone unit length in this study. An analysis showed that the average length of tone units was four words. 80% of all tone units were between one and seven words long, a result identical to Crystal's. Over-all, tone unit length varied from one to 18 words. (Table 3.5)

3.4 CROSSTABULATION ANALYSIS OF TONE UNIT LENGTH BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between nuclear tone types and tone unit lengths. Results showed that the following nuclear tone types occurred in marginally greater numbers in tone units of four words long than they occurred on any other length; narrow fall (21.9%), fall-plus-rise (20.0%), level (17.6%), terminal rise (16.7%), and fall (16.9%). The rise-fall tone occurred in tone units of three and four words long

44.4% of the time, with 22.2% of its tone units on each length. The exception to this general pattern was the rising tone, which had 54.8% of its tone units comprising one word in length. This high percentage of short tone units appears due to the nature of the communicative situation in which subjects did not typically ask questions (the main function of rising tones), but rather answered them. Any questions they did ask usually sought confirmation or repetition of an instruction, such as "pardon?", or "what?".

Over-all the strength of the relationship between nuclear tone type and tone unit length in words, in the entire sample, (Cramer's V = .18) is statistically significant at the .01 level of confidence (Table 3.6).

3.5 CROSSTABULATION ANALYSIS OF TONE UNIT LENGTH IN WORDS BY SEX OF SPEAKER

Crosstabulation analysis was carried out to investigate the relationship between tone unit length in words used and sex of the speaker. Results showed that boys and girls used tone units of one word in length in equal proportions, 9.0% of the time each. Tone units of three, five, eight, nine and ten words long were used in comparable proportions by boys and girls with 13.7% and 13.1%; 13.9% and 14.3%; 5.0% and 5.4%; 3.7% and 3.8%; and 1.8% and 1.4% respectively. Boys used tone units of four and six words more frequently than girls did, with 19.0% and 14.7%; 14.7% and 13.1% respectively.

The over-all strength of the relationship between tone unit and sex of the speaker (Cramer's V = .10) is

statistically significant at the .05 level of confidence (table 3.7 & 3.8).

3.6 ANALYSIS OF THE TONE UNIT HEAD

The length of the tone unit head was examined in conjunction with the overall length of the tone unit since the total tone unit length is largely dependent upon the size of the head. Analysis revealed that the average length of the head was 2.9 words long. Head length varied from one word to ten words. 27.2% of all heads were two words long, 24.4% were three words long, 18.3% were one word in length and 13.3% were four words in length. 91.6% of all heads were between one and five words in length.

Analysis of the presence of the head in the tone unit was also examined. Davy (1964) and Crystal (1969) have investigated the head of the tone unit and found it to be present in their respective data 64.0% and 70.0% in completed tone units. It was expected that similar proportions would be found in the present study. Analysis showed that heads were present 66.5% of the time. Those tone units containing narrow falls and fall-rise nuclear tones had heads present 72.6% and 70.0% of the time respectively. Terminal rise tone units had heads present 69.3% of the time, while tone units containing falls had heads present 67.1% of the time. Level and fall-plus-rise tone units had heads present 62.1% and 66.7% of the time respectively. The exception to this general pattern were those tone units containing rising tones. These recorded heads present only 28.6% of the time. A large percentage of these tone units comprise one word in length, thus they

only contained a nuclear tone which explains this result. (Table 3.9a & 3.9b).

3.7 CROSSTABULATION ANALYSIS OF HEAD LENGTH IN WORDS BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between head length in words (where heads were present in the tone unit) and type of nuclear tone used. Results revealed that of the falling tone units with heads (68.0%), 28.9% of these heads were 2 words long. Of the 62.1% of level tone units with heads present, 24.9% had heads of 2 words long. For the terminal rise, narrow fall, and fall-rise tone units, which had heads present 69.3%, 72.6%, and 70.0% of the time respectively 27.5%, 28.2% and 29.7% had head lengths of 3 words long respectively. Of the 28.6% of rising tone units which did contain heads, 41.6% had heads of one word in length.

The over-all strength of the relationship between head length in words and type of nuclear tone used (Cramer's V = .08) is not statistically significant at the .05 level of confidence. (Table 3.10 & 3.11).

3.8 CROSSTABULATION ANALYSIS OF TONE UNIT HEAD LENGTH AND PRESENCE BY SEX OF SPEAKER

Crosstabulation analysis was carried out in order to investigate the relationship between head length and its presence and sex of the speaker. Results showed that boys had heads present in tone units marginally more than girls, 67.0% and 66.1% respectively. Both sexes recorded a bigger

percentage of head lengths of two words with 27.7% and 26.6% for boys and girls respectively. The next highest percentage recorded head lengths of three words, boys used this length 25.0% of the time and girls 23.7% of the time. Together these two percentages, for head lengths of two and three words constitute 52.7% of all head lengths used by boys and 50.3% of those used by girls. With reference to table 3.12 boys used head lengths of one, two, three, six and seven more than girls, while girls used head lengths of four, five, eight, nine and ten more than boys.

The strength of this relationship (Cramer's V = .07) is not statistically significant at the .05 level of confidence (Table 3.12 & 3.13).

3.9 ANALYSIS OF THE PRESENCE OF THE PREHEAD

No previous research has investigated the number of times a prehead is present in tone units. The number of words over which it occurs, was not investigated since Crystal states that preheads are usually confined to a very small number of words and more especially to a few syllables. Its presence, therefore, rather than its length, was investigated. Analysis revealed that the prehead was present in 73.5% of all tone units, that is, approximately three quarters of all tone units contained preheads (Table 3.14).

3.10 CROSSTABULATION OF THE PREHEAD BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between the presence of the prehead and type

of nuclear tone. Results showed that the tone units with most preheads present, were the fall-rise and fall-plus-rise, with 80.0% each. Fall tone units had preheads present 75.4% of the time and terminal rise tone units 74.0%. Preheads were present in narrow fall tone units 68.5% of the time, and 71.2% of the time in level tone units. Tone units containing a rising tone were the exception to this, recording preheads 33.3% of the time. This result is again, a function of the characteristic length of those tone units, which is one to two words. Preheads would not therefore, be expected to occur in high numbers with this tone type.

The strength of this relationship (Cramer's V = .17) is statistically significant at the .01 level of confidence (Table 3.14).

3.11 CROSSTABULATION ANALYSIS OF THE PREHEAD BY SEX OF SPEAKER

Crosstabulation analysis was carried out to investigate the relationship between the presence of the tone unit prehead and sex of the speaker. Results revealed that boys recorded more preheads than girls with 76.2% and 70.7% respectively. When these two percentages are averaged, 73.5%, boys recorded 51.9% and girls 48.1% of that 73.5%.

The strength of this relationship (Cramer's V = .06) is statistically significant at the .01 level of confidence (Table 3.15 & 3.16).

3.12 ANALYSIS OF THE TAIL

Presence of the tone unit tail was investigated.

Since the tail usually comprises only a small number of syllables (Crystal 1969), it was thought more appropriate to establish its occurrence. No predictions were made as to its occurrence, since no previous research has investigated this. Results revealed that tails were present in 21.7% of all tone units, that is, approximately a quarter of the time. (Table 3.17).

3.13 CROSSTABULATION ANALYSIS OF THE PRESENCE OF THE TAIL BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between presence of the tone unit tail and sex of the speaker. Results showed that those tone units containing rise-fall tones recorded the highest occurrence of tails; 44.4%. The fall and narrow fall tone units recorded the next highest occurrence of tails with 28.5% and 27.4% respectively. The level tone units recorded the tail present 25.2% of the time. Tone units recording a relatively low occurrence of tails were the terminal rise, fall-rise and rise tone units with 14.6%, 4.6% and 2.4% respectively. This last finding again reflects the characteristic length of tone units containing rises, that is, one to two words.

The strength of this relationship (Cramer's V = .37) is statistically significant at the .01 level of confidence. (Table 3.17).

3.14 CROSSTABULATION ANALYSIS OF PRESENCE OF THE TAIL BY SEX OF SPEAKER

Crosstabulation analysis was carried out to investigate the relationship between presence of the tail and sex of the speaker. Results showed that boys and girls recorded tails in similar proportions, with 21.6% and 21.4% respectively.

The strength of this relationship (Cramer's V = .02) is not statistically significant at the .05 level of confidence. (Table 3.18 & 3.19).

3.15 THE DISTRIBUTION OF PAUSE IN THE TONE UNIT

Four lengths of pause were examined; brief, unit, double and treble, in terms of their frequency of occurrence within tone units. Crystal states that "While we do have a number of valuable hypotheses about the occurrence of pausal phenomena in English, very few of these have been verified, and little distributional analysis has in fact taken place." (p 170). The present study attempts to establish norms for pausal frequency in the sample analysed. Results showed that brief and unit pauses were used more than the other two lengths. Brief pause was used 43.8% and the unit pause 42.8%. Together these two lengths accounted for 86.6% of all pauses used. Double and treble pauses accounted for the remaining 13.4% with 10.3% and 3.1% respectively (Table 3.20).

3.16 ANALYSIS OF PAUSE LENGTH IN THE TONE UNIT

Four possible positions where pauses could occur in the tone unit, outlined in chapter two, were specified in

this study. They were "initial", "inside", "end", and "before-the-next-tone unit". Each pause length was analysed for frequency of occurrence in the four positions. Results revealed that unit pauses occurred more frequently in the initial position than any other length, with 54.5%. The next most frequently occurring pause in this position was brief pause with 28.8%. Together these two lengths account for 83.3% of the pauses used in the initial position. The remaining 16.7% was distributed between double and treble pauses, occurring 13.0% and 3.7% respectively. In the inside position brief pauses occurred more frequently than any other pause, accounting for 55.3%. Unit pauses accounted for 35.1% in this position. Together these two pauses accounted for 90.4%. The remaining 9.6% was distributed between double and treble pauses, with 7.8% and 1.8% respectively. In the end position brief pauses accounted for 56.5% of pauses occurring in this position. Unit pauses accounted for 32.5%. Taken together these 2 pauses accounted for 89%. Double and treble pauses accounted for 8.1% and 2.7% respectively. In the, before-the-next-tone unit position, brief pauses accounted for 47.3% of all the pauses in this position, followed by the unit pause which accounted for 34.2%. Double and treble pauses accounted for the remaining 18.5% with 10.5% and 8.0% repsectively. To summarize, brief pauses accounted for the biggest proportion of all pauses used in the inside, end and before-the-next-tone unit positions, while unit pauses accounted for the biggest proportion of all pauses used in the initial position. Together these two pauses accounted for over 80% of all pauses used in all four positions. (Table 3.21-3.25).

3.17 ANALYSIS OF PAUSE DISTRIBUTION IN THE TONE UNIT

Of the four positions where pauses were recorded the initial position recorded a bigger percentage of all pauses used than any other position in the tone unit. This position recorded 42.4% of all pauses. The inside position recorded 33.1%. Together, these two positions accounted for 75.5% of all pauses recorded and 24.5% was distributed between pauses recorded in the end position and the before-the-next-tone unit position with 18.7% and 5.8% respectively. Pauses recorded in the initial position can indicate both taking in breath and collecting one's thoughts before beginning to speak. This can also be said of pauses occurring in the end position and the before the next tone unit position, whereas those pauses recorded in the inside position can be attributed only to hesitation, since the tone units are sufficiently short, on average, not to require a pause for breath. (Table 3.26).

3.18 CROSSTABULATION OF PAUSE BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out in order to investigate the relationship between pause and the nuclear tone type used. Given speculations regarding the terminal rise indicating hesitation and uncertainty, it was expected that it would have more pauses occurring with it than other tone types.

Results revealed that this was so. Those tone units containing terminal rise nuclei recorded more pauses than any other tone unit type. Of the 492 tone units containing terminal rises, 541 pauses of various lengths over the four

positions, were recorded. This result was followed in comparable proportions by level tone units. For the 306 level tone units, 328 pauses were recorded. 136 pauses occurred with the 130 fall-rise tone units. The tone units containing falls, 861, recorded 782 pauses. The lowest number of pauses was recorded for the 42 rise tone units, 20 pauses.

The strength of this relationship between pause and nuclear tone type (Cramer's V = .08) is statistically significant at the .05 level of confidence.

3.19 CROSSTABULATION ANALYSIS OF PAUSE IN THE INITIAL POSITION BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between pause and nuclear tone type. Of the 782 pauses recorded with fall tone units, 46.1% were in the initial position. Of that 46.1%, 55.5% were unit pauses, and 29.6% brief pauses. Together these pauses accounted for 85.1%. The remaining 14.9% was distributed between double and treble pauses with 11.3% and 3.6% respectively. Of the 541 pauses recorded with terminal rise tone units 41.6% were in this position. Of that 41.6%, 48.8% were unit pauses and 28.5% brief pauses. Together these two lengths of pauses accounted for 77.3%. The double and treble pauses accounted for the remaining 22.7%, with 18.3% and 4.4% respectively. Of the 328 pauses recorded with level tone units 37.1% occurred in this position. Of that 37.1%, 58.2% were unit pauses, 29.5% brief pauses, 10.6% double pauses and 1.6% treble pauses. Together the unit and brief pauses accounted for 87.7%. Of

the 136 pauses recorded with fall-rise tone units 34.5% were recorded here. Of that 34.5%, 63.8% were unit pauses, and 23.4% were brief pauses, totalling 87.2%. The remaining 12.8% was distributed between double and treble pauses with 10.6% and 2.2% respectively. Of the 59 pauses recorded with narrow-fall tone units 38.9% were recorded in this position. Since the numbers involved in this 39.9% are small, they will not be discussed here (see Table 3.32). The exception to this general pattern of pause length distribution in this position, is tone units containing rising tones. Of the 20 pauses recorded with these tone units 85.0% were recorded here. (The numbers involved are small and are therefore summarized in Table 3.37).

To summarize, the tone types discussed had the biggest percentage of their pauses recorded in the initial position, rising tone units having the biggest, with the exception of the fall-rise. Over the entire sample the strength of the relationship between pause in the initial position and nuclear tone type (Cramer's V = .09) is not statistically significant at the .05 level of confidence.

(Tables 3.27,3.31,3.32,3.36,3.37,3.40,3.41,3.45,3.46,3.50, 3.51 & 3.55)

3.20 CROSSTABULATION ANALYSIS OF PAUSE LENGTH IN THE INSIDE POSITION BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between pauses recorded in the inside position of the tone unit and the type of nuclear tone used. Fall-rise tone units recorded the biggest percentage of pauses in this position with 38.2%. Of that 38.2%, 48.0% were brief pauses and 40.4% were unit pauses, totalling 88.4%.

The remaining 11.6% was divided between double and treble pause with 7.7% and 3.9% respectively. Fall tone units recorded the next biggest percentage of pauses here with 34.6%. Of that 34.6%, 57.9% were brief pauses, 34.3% were unit pauses, 5.5% double pauses and 2.3% treble pauses. Together the brief and unit pauses accounted for 92.5% of these pauses. Terminal rise tone units recorded 33.8% of pauses in this position. Of that 33.8%, 53.6% were brief pauses and 35.0% unit pauses, totalling 88.6%. The remaining 11.4% was distributed between double and treble pauses with 10.4% and 1.0% respectively. Level tone units recorded 28.3% of pauses here. 54.8% of these pauses were brief pauses and 36.5% unit pauses, totalling 91,3%. Double and treble pauses accounted for the remaining 8.7% with 7.5% and 1.2% respectively. Narrow fall tone units recorded 35.6% of pauses in the inside position. The distribution of that 35.6% between the four lengths of pauses is summarized in Table 3.33, since the numbers involved are too small to discuss. Finally rise tone units recorded 5.0% of pauses here, but since only one pause is involved it will not be discussed. (Table 3.38)

Over the entire sample the strength of the relationship between pause in the inside position of the tone unit and the nuclear tone type used (Cramer's V = .09) is not statistically significant at the .05 level of confidence. (Tables 3.28,3.31,3.33,3.36,3.38,3.40,3.42,3.45,3.47,3.50,3.52,3.55)

3.21 CROSSTABULATION ANALYSIS OF PAUSE IN THE END POSITION BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate

the relationship between pauses recorded in the end position of the tone unit and the type of nuclear tone used.[6] Level tone units recorded the biggest percentage of pauses in this position with 26.7%. Fall-rise and narrow-fall tone units recorded 24.2% and 22.1% of pauses here. Terminal rise, fall and rise tone units recorded the smallest percentage of pauses here with 19.2%, 13.5% and 10.0% respectively. Over the entire sample the strength of the relationship between pauses recorded in the end position of the tone unit and the nuclear tone type used (Cramer's V = .12) is statistically significant at the .01 level of confidence. (Tables 3.29,3.31,3.34,3.36,3.39,3.40,3.43,3.45,3.48,3.50,3.53,3.55).

3.22 CROSSTABULATION ANALYSIS OF PAUSE IN THE "BEFORE-THE-NEXT-TONE UNIT" POSITION BY NUCLEAR TONE TYPE

Crosstabulation analysis was carried out to investigate the relationship between pauses recorded in the before-the-next-tone unit position and the type of nuclear tone used.[7] The level tone units recorded the most pauses in this position with 7.9%. Fall and terminal rise tone units recorded 5.6% and 5.4% of pauses here respectively. Narrow fall tone units recorded 3.4% of pauses here while fall-rise tone units recorded 3.1%. Rise tone units did not record any pauses here, since no rise tone units were followed by another tone unit.

Over all the strength of the relationship between pauses recorded in the before-the-next-tone unit position and the nuclear tone type used (Cramer's V = .10) is statistically significant at the .05 level of confidence. (Tables 3.30,3.31,3.35,3.36,3.40,3.44,3.45,3.49,3.50,3.54 & 3.55).

3.23 CROSSTABULATION ANALYSIS OF PAUSE IN THE INITIAL POSITION BY SEX OF SPEAKER

Crosstabulation analysis was carried out in order to investigate the relationship between pause in the initial position by sex of the speaker. Results revealed that girls recorded 50.2% of pauses here while boys recorded 49.8%. Girls recorded, 50.4% of the brief pauses in this position, while boys recorded 49.6%. Boys recorded more unit pauses than girls with 52.4% and 47.6% respectively. Girls recorded more double pauses here than boys with 52.3% and 47.7%. Girls also recorded more treble pauses than boys; 80.0% and 20.0% respectively.

Of all the pauses recorded by girls 43.8% were in this position. Of that, 51.6% were unit pauses, 29.1% brief pauses, 13.6% double pauses and 5.7% were treble pauses.

Boys recorded 41.2% of all their pauses in this position. Of that, 57.3% were unit pauses, 28.7% brief pauses, 12.6% double pauses and 1.5% treble pauses.

The strength of the relationship between pause in the initial position and sex of the speaker (Cramer's V = .08) is statistically significant at the .05 level of confidence. (Table 3.56, 3.57, 3.58, 3.68, 3.69, 3.70 & 3.71).

3.24 CROSSTABULATION ANALYSIS OF PAUSE IN THE INSIDE POSITION BY SEX OF SPEAKER

Crosstabulation analysis was carried out in order to investigate the relationship between pause in the inside

position and sex of the speaker. Results revealed that boys recorded 53.0% of the pauses here while girls recorded 47.0%. Boys recorded 59.2% of the brief pauses, girls 40.8%. Girls recorded more unit pauses than boys with 54.4% and 45.6% respectively. Girls also recorded more double pauses than boys with 56.9% and 43.1% respectively. Boys recorded more treble pauses than girls with 58.3% and 41.7% respectively.

34.2% of all pauses recorded by boys were in this position. Of that, 61.5% were brief pauses, 30.2% unit pauses, 6.3% double pauses and 2.0% were treble pauses.

32.0% of all pauses recorded by girls were in this position. 48.2% were brief pauses, 40.6% unit pauses, 9.5% double pauses and 1.6% were treble pauses.

The strength of the relationship between pause in the inside position and sex of the speaker (Cramer's V = .08) is statistically significant at the .01 level of confidence. (Table 3.59, 3.60, 3.61, 3.68, 3.69 & 3.70).

3.25 CROSSTABULATION ANALYSIS OF PAUSE IN THE END POSITION BY SEX OF SPEAKER

Crosstabulation analysis was carried out in order to investigate the relationship between pause in the end position and sex of the speaker. Results revealed that boys recorded 56.0% of the pauses here while girls recorded 44.0%. Boys recorded more brief pauses than girls with 56.0% and 44.0% respectively. Boys also recorded more unit pauses

than girls with 53.8% and 46.2% respectively. Boys recorded 70.0% of the double pauses, girls 30.0%. Girls recorded more treble pauses than boys with 60.0% and 40.0% respectively.

20.3% of all pauses recorded by boys were in this position. Of that, 56.6% were brief pauses, 31.2% unit pauses, 10.2% double pauses and 2.0% were treble pauses.

16.8% of all pauses recorded by girls were in this position. Of that, 56.5% were brief pauses, 34.2% unit pauses, 5.6% double pauses and 3.7% were treble pauses.

The strength of the relationship between pause in the end position and sex of the speaker (Cramer's V = .07) is statistically significant at the .05 level of confidence. (Table 3.62, 3.63, 3.64, 3.68, 3.69 & 3.70).

3.26 CROSSTABULATION ANALYSIS OF PAUSE IN THE BEFORE-THE-NEXT-TONE UNIT POSITION BY SEX OF SPEAKER

Crosstabulation analysis was carried out in order to establish the relationship between pause in the before-the-next-tone unit position and sex of the speaker. Results revealed that girls recorded 62.3% of the pauses here while boys recorded 37.7%. Girls recorded 53.7% of the brief pauses and boys recorded 46.3%. Girls recorded more unit pauses than boys with 64.0% and 36.0% respectively. Girls also recorded more double pauses than boys with 75.0% and 25.0% respectively as well as more treble pauses than boys with 88.0% and 11.2% respectively.

7.4% of all pauses recorded by girls were in this position while boys recorded 4.3% of all their pauses here.[8]

The strength of the relationship between pause in the before-the-next-tone unit position and sex of the speaker (Cramer's V = .07) is statistically significant at the .01 level of confidence. (Table 3.65, 3.66, 3.67, 3.68, 3.69 & 3.70).

1. Davy's research looked at two modes; conversation and monologues. It is the results of the former mode being discussed here.

2. The percentages for each tone type are cumulative percentages for the narrow, wide and unmarked norm of each tone type. Throughout the rest of the study these three categories are considered separately.

3. The first section 3.1 has discussed all nuclear tone types but subsequent sections have only discussed those tone types or results of particular interest; all results are presented in Tables 3.1 - 3.70.

4. This refers to communication situations which have been recorded surreptitiously.

5. See method (Chapter Two, Section 2.7) for interpretation of statistical significance.

6. Since the numbers involved in the percentage figures for pauses in this position are relatively small, only the overall percentages will be discussed in the text, the individual length percentages detailed in Table 3.29 - 3.55.

7. Only the initial percentage figures will be discussed here. The various lengths of pause making up those percentages will be detailed in Table 3.39 - 3.55.

8. Only the initial percentage figures will be discussed here. The various lengths of pause comprising those percentages are detailed in Table 3.65 - 3.67.

Nuclear tone Type	Study			
	Quirk et al	Davy	Crystal	Meikle
Fall	52.5	58.7	51.2	47.3
Rise	24.7	16.1	20.8	3.0
Level	2.1	8.0	4.9	15.3
Fall-Rise	6.9	7.4	8.5	7.4
Rise-Fall	3.9	4.2	5.2	0.7
Fall-plus-Rise	9.3	5.1	7.7	1.5
Rise-plus-Fall	0.6	0.4	1.7	0.2
Terminal Rise	-	-	-	24.6
Total	100.0	100.0	100.0	100.0

Table 3.1 Proportions of nuclear tone types across four studies (expressed as percentages)

Nuclear Tone Type	Absolute Frequency	Relative (%) Frequency
Fall	861	43.1
wide fall	14	0.6
narrow fall	73	3.6
rise	42	2.1
wide rise	2	0.1
narrow rise	15	0.8
terminal rise	492	24.6
level	306	15.3
rise-fall	9	0.4
wide rise-fall	3	0.1
narrow rise-fall	4	0.2
fall-rise	130	6.5
wide fall-rise	3	0.2
narrow fall-rise	13	0.7
narrow rise-plus-fall	3	0.2
fall-plus-rise	30	1.5
Total	2000	100.00

Table 3.2 Proportions of nuclear tone types

Nuclear tone type	Male
Fall	426 (42.6)
Wide fall	10 (1.0)
Narrow fall	42 (4.2)
Rise	27 (2.7)
Wide rise	0 (0)
Narrow rise	11 (1.1)
Terminal rise	254 (25.4)
Level	152 (15.2)
Rise-fall	5 (0.5)
Wide rise-fall	3 (0.3)
Narrow rise-fall	0 (0)
Fall-rise	46 (4.6)
Wide fall-rise	1 (0.1)
Narrow fall-rise	3 (0.3)
Narrow rise-plus-fall	3 (0.3)
Fall-plus-rise	16 (1.6)
Total	1000 (100.0)

Nuclear tone type	Female
Fall	435 (43.5)
Wide fall	4 (0.4)
Narrow fall	31 (3.1)
Rise	15 (1.5)
Wide rise	2 (0.2)
Narrow rise	4 (0.4)
Terminal rise	238 (23.8)
Level	154 (15.4)
Rise-fall	4 (0.4)
Wide rise-fall	0 (0)
Narrow rise-fall	3 (0.3)
Fall-rise	84 (8.4)
Wide fall-rise	2 (0.2)
Narrow fall-rise	10 (1.0)
Narrow rise-plus-fall	0 (0)
Fall-plus-rise	14 (1.4)
Total	1000 (100.0)

Table 3.3 Nuclear tone type by sex. Intraindividual differences

Nuclear Tone Type	Male	Female
Fall	426 (49.5)	435 (50.5)
wide fall	10 (71.4)	4 (28.6)
narrow fall	42 (57.5)	31 (42.5)
rise	27 (64.3)	15 (35.7)
wide rise	0 (0)	2 (100.0)
narrow rise	11 (73.3)	4 (26.7)
terminal rise	254 (51.6)	238 (48.4)
level	152 (49.7)	154 (50.3)
rise-fall	5 (55.6)	4 (44.4)
wide rise-fall	3 (100.0)	0 (0)
narrow rise-fall	0 (0)	3 (100.0)
fall-rise	46 (35.4)	84 (64.6)
wide fall-rise	1 (33.3)	2 (66.7)
narrow fall-rise	3 (23.1)	10 (76.9)
narrow rise-plus-fall	3 (100.0)	0 (0)
fall-plus-rise	16 (53.3)	14 (46.7)
Total	1000	1000

Table 3.4 Nuclear tone type by sex. Interindividual differences.

Number of words	Absolute frequency	Relative frequency(%)
1	180	9.0
2	245	12.3
3	268	13.4
4	337	16.9
5	282	14.1
6	277	13.8
7	164	8.2
8	105	5.3
9	75	3.7
10	32	1.6
11	18	0.9
12	13	0.6
13	2	0.1
18	2	0.1
Total	2000	100.0

Table 3.5 Tone unit length in words.

Nuclear tone type	Tone unit length in words														
	1	2	3	4	5	6	7	8	9	10	11	12	13	18	Total
Fall	62 (7.2)	101 (11.7)	121 (14.0)	146 (16.9)	117 (13.6)	120 (13.9)	80 (9.3)	53 (6.1)	32 (3.7)	14 (1.6)	8 (0.9)	5 (0.6)	1 (0.1)	1 (0.1)	861 (100.0)
Wide fall	4 (28.5)	1 (7.1)	3 (21.4)	0	1 (7.1)	1 (7.1)	1 (7.1)	1 (7.1)	1 (7.1)	0	0	1 (7.1)	0	0	14 (100.0)
Narrow fall	5 (6.8)	5 (6.8)	3 (4.1)	16 (21.9)	12 (16.4)	15 (20.5)	7 (9.6)	5 (6.8)	3 (4.1)	1 (1.4)	1 (1.4)	0	0	0	73 (100.0)
Rise	23 (54.8)	8 (19.0)	4 (9.5)	1 (2.4)	2 (4.8)	3 (7.1)	0	0	1 (2.4)	0	0	0	0	0	42 (100.0)
Wide rise	2 (100.0)	0	0	0	0	0	0	0	0	0	0	0	0	0	2 (100.0)
Narrow rise	0	5 (33.3)	0	3 (20.0)	2 (13.3)	2 (13.3)	0	2 (13.3)	1 (6.7)	0	0	0	0	0	15 (100.0)
Terminal rise	34 (6.9)	67 (13.6)	72 (14.6)	82 (16.7)	65 (13.2)	72 (14.6)	40 (8.1)	23 (4.7)	18 (3.7)	9 (1.8)	6 (1.2)	3 (0.6)	1 (0.2)	0	492 (100.0)
Level	39 (12.7)	36 (11.8)	41 (13.4)	54 (17.6)	49 (16.0)	38 (12.4)	19 (6.2)	15 (4.9)	9 (2.9)	4 (1.3)	2 (0.7)	0 0	0 0	0 0	306 (100.0)
Rise-fall	0	0	2 (22.2)	2 (22.2)	1 (11.1)	0	1 (11.1)	0 (22.2)	2	0	1 (11.1)	0	0	0	9 (100.0)
Wide rise-fall	0	0	0	0	0	2 (66.7)	0	0	0	0	0	0	0	1 (33.3)	3 (100.0)
Narrow rise-fall	0	1 (33.3)	1 (33.3)	0	1 (33.3)	0	0	0	0	0	0	0	0	0	4 (100.0)
Fall-rise	10 (7.7)	16 (12.3)	13 (10.0)	25 (19.2)	25 (19.2)	19 (14.6)	9 (6.9)	4 (3.1)	5 (3.8)	2 (1.5)	0 0	2 (1.5)	0 0	0 0	130 (100.0)
Wide fall-rise	0	1 (33.3)	0	1 (33.3)	0	1 (33.3)	0	0	0	0	0	0	0	0	3 (100.0)
Narrow fall-rise	1 (7.7)	3 (23.1)	2 (15.4)	1 (7.7)	1 (7.7)	3 (23.1)	1 (7.7)	0	1 (7.7)	0	0	0	0	0	13 (100.0)
Narrow rise-plus-fall	0	0	1 (33.3)	0	1 (33.3)	0	1 (33.3)	0	0	0	0	0	0	0	3 (100.0)
Fall-plus-rise	0	1 (3.3)	5 (16.7)	6 (20.0)	5 (16.7)	2 (6.7)	5 (16.7)	1 (3.3)	2 (6.7)	2 (6.7)	0	1 (3.3)	0	0	30 (100.0)

Table 3.6 : Nuclear tone type by tone unit length

Number of words	Male	Number of words	Female
1	90 (9.0)	1	90 (9.0)
2	110 (11.0)	2	135 (13.5)
3	137 (13.7)	3	131 (13.1)
4	190 (19.0)	4	147 (14.7)
5	139 (13.9)	5	143 (14.3)
6	146 (14.6)	6	131 (13.1)
7	69 (6.9)	7	95 (9.5)
8	50 (5.0)	8	55 (5.5)
9	37 (3.7)	9	38 (3.8)
10	18 (1.8)	10	14 (1.4)
11	8 (0.8)	11	10 (1.0)
12	3 (0.3)	12	10 (1.0)
13	1 (0.1)	13	1 (0.1)
18	1 (0.1)	18	1 (0.1)
Total	1000 (100.0)	Total	1000 (100.0)

Table 3.7 Tone unit length in words by sex.

Intraindividual differences.

Tone unit length in words	Male	Female
1	90 (50.0)	90 (50.0)
2	110 (44.9)	135 (55.1)
3	137 (51.1)	131 (48.9)
4	190 (56.4)	147 (43.6)
5	139 (49.3)	143 (50.7)
6	146 (52.9)	131 (47.1)
7	69 (42.1)	95 (57.9)
8	50 (48.1)	55 (51.9)
9	37 (49.3)	38 (50.7)
10	18 (56.3)	14 (43.8)
11	8 (44.4)	10 (55.6)
12	3 (25.0)	10 (75.0)
13	1 (50.0)	1 (50.0)
18	1 (50.0)	1 (50.0)
Total	1000	1000

Table 3.8 Tone unit length by sex. Interindividual differences.

Head length in words	Absolute frequency	Relative frequency (%)
1	244	18.3
2	362	27.2
3	325	24.4
4	177	13.3
5	112	8.4
6	52	4.0
7	23	1.7
8	21	1.6
9	13	1.0
10	2	0.1
Total	1331	100.0

Table 3.9a Head length in words, presence of head.

Number of Words	Absolute frequency	Relative(%) frequency
0	669	33.5
1	244	12.2
2	362	18.1
3	325	16.3
4	177	8.9
5	112	5.6
6	52	2.6
7	23	1.2
8	21	1.1
9	13	0.7
10	2	0.1
Total	2000	100.0

Table 3.9b Head length in words; presence and absence of head.

Nuclear tone type	Presence of head
Fall	578 (67.1)
Wide fall	10 (71.4)
Narrow fall	53 (72.6)
Rise	12 (28.5)
Wide rise	0 (0)
Narrow rise	11 (73.3)
Terminal rise	341 (69.3)
Level	190 (62.1)
Rise-fall	8 (88.8)
Wide rise-fall	3 (100.0)
Narrow rise-fall	2 (66.6)
Fall-rise	91 (70.0)
Wide fall-rise	2 (66.6)
Narrow fall-rise	8 (61.5)
Narrow rise-plus-fall	2 (66.6)
Fall-plus-rise	20 (66.7)

Table 3.10: Nuclear tone type by presence of head

Nuclear tone type	Headlength in words										
	1	2	3	4	5	6	7	8	9	10	Total
Fall	99 (17.1)	170 (29.4)	134 (23.1)	80 (13.8)	49 (8.4)	25 (4.3)	6 (1.0)	10 (1.7)	4 (0.7)	1 (0.1)	578 (100.0)
Wide fall	3 (30.0)	1 (10.0)	4 (40.0)	1 (10.0)	1 (10.0)	0	0	0	0	0	10 (100.0)
Narrow fall	4 (7.6)	14 (26.4)	15 (28.4)	8 (15.1)	7 (13.3)	2 (3.7)	2 (3.7)	0	1 (1.8)	0	53 (100.0)
Rise	5 (41.8)	2 (16.6)	1 (8.4)	2 (16.6)	2 (16.6)	0	0	0	0	0	12 (100.0)
Wide rise	0	0	0	0	0	0	0	0	0	0	0 (100.0)
Narrow rise	4 (36.4)	2 (18.1)	3 (27.4)	2 (18.1)	0	0	0	0	0	0	11 (100.0)
Terminal rise	55 (16.1)	85 (25.0)	94 (27.6)	44 (13.0)	30 (8.8)	15 (4.4)	8 (2.3)	5 (1.4)	4 (1.1)	1 (0.3)	341 (100.0)
Level	52 (27.4)	55 (29.0)	39 (20.5)	20 (10.5)	14 (7.3)	3 (1.6)	3 (1.6)	3 (1.6)	1 (0.5)	0	185 (100.0)
Rise-fall	0	1 (12.5)	3 (37.5)	2 (25.0)	1 (12.5)	0	0	0	1 (12.5)	0	8 (100.0)
Wide Rise-fall	0	1 (33.3)	0	1 (33.3)	1 (33.3)	0	0	0	0	0	3 (100.0)
Narrow rise-fall	0	1 (50.0)	0	1 (50.0)	0	0	0	0	0	0	2 (100.0)
Fall-rise	14 (15.5)	25 (27.6)	27 (29.5)	8 (8.7)	5 (5.5)	5 (5.5)	3 (3.3)	2 (2.2)	2 (2.2)	0	91 (100.0)
Wide fall-rise	0	1 (50.0)	1 (50.0)	0	0	0	0	0	0	0	2 (100.0)
Narrow fall-rise	2 (25.0)	0	1 (12.5)	4 (50.0)	0	0	0	1 (12.5)	0	0	8 (100.0)
Narrow rise-plus-fall	1 (50.0)	0	0	1 (50.0)	0	0	0	0	0	0	2 (100.0)
Fall-plus-rise	5 (25.0)	4 (20.0)	3 (15.0)	3 (15.0)	3 (15.0)	2 (10.0)	0	0	0	0	20 (100.0)

Table 3.11 : Nuclear tone type by head length

Head length in words	Male	Head length in words	Female
1	131 (19.5)	1	113 (17.0)
2	186 (27.7)	2	176 (26.6)
3	168 (25.0)	3	157 (24.0)
4	88 (13.2)	4	89 (13.5)
5	44 (6.6)	5	68 (10.2)
6	28 (4.2)	6	24 (3.6)
7	10 (1.5)	7	13 (2.0)
8	11 (1.6)	8	10 (1.5)
9	4 (0.6)	9	9 (1.3)
10	0 (0)	10	2 (0.3)
Total	1000 (100.0)	Total	1000 (100.0)

Table 3.12 Head length by sex. Intraindividual differences.

Head length in Words	Male	Female
1	131 (53.7)	113 (46.3)
2	186 (51.4)	176 (48.6)
3	168 (51.7)	157 (48.3)
4	88 (49.7)	89 (50.3)
5	44 (38.9)	68 (61.1)
6	28 (53.8)	24 (46.2)
7	10 (45.5)	13 (54.5)
8	11 (52.4)	10 (47.6)
9	4 (30.8)	9 (69.2)
10	0 (0)	2 (100.0)
Total	670 (50.3)	661 (49.7)

Table 3.13 Head length by sex. Interindividual differences.

Nuclear Tone Type	Presence of the Prehead
Fall	650 (75.4)
Widefall	6 (43.0)
Narrowfall	50 (68.5)
Rise	14 (33.3)
Wide rise	0 (0)
Narrow rise	13 (86.7)
Terminal rise	364 (74.0)
Level	218 (71.2)
Rise-fall	4 (44.4)
Wide rise-fall	2 (66.7)
Narrow rise-fall	2 (66.7)
Fall-rise	104 (80.0)
Wide fall-rise	3 (100.0)
Narrow fall-rise	9 (69.2)
Narrow rise-plus-fall	3 (100.0)
Fall-plus-rise	24 (80.0)
Total	1471 (73.5)

Table 3.14 Nuclear tone type by presence of the prehead.

	Male	Female
Presence of prehead	762 (76.2)	709 (70.9)

Table 3.15 Presence of the prehead by sex. Intraindividual differences.

	Male	Female
Presence of prehead	762 (51.9)	709 (48.1)

Table 3.16 Presence of the prehead by sex. Interindividual differences.

Nuclear Tone Type	Presence of the Tail
Fall	246 (28.5)
Wide fall	4 (28.5)
Narrow fall	20 (27.4)
Rise	1 (2.4)
Wide rise	0 (0)
Narrow rise	0 (0)
Terminal rise	72 (14.6)
Level	77 (25.2)
Rise-fall	4 (44.4)
Wide rise-fall	0 (0)
Narrow rise-fall	0 (0)
Fall-rise	6 (4.6)
Wide fall-rise	0 (0)
Narrow fall-rise	0 (0)
Narrow rise-plus-fall	0 (0)
Fall-plus-rise	2 (6.7)
Total	433 (21.7)

Table 3.17 Nuclear tone type by presence of the tail.

	Male	Female
Presence of tail	216 (21.6)	214 (21.4)

Table 3.18 Presence of the tail by sex. Intraindividual differences.

	Male	Female
Presence of tail	216 (50.2)	214 (49.8)

Table 3.19 Presence of the tail by sex. Interindividual differences.

Pause length	Absolute frequency	Relative frequency (%)
Brief	861	43.8
Unit	841	42.9
Double	201	10.3
Treble	62	3.1
Total	1965	100.0

Table 3.20 Proportions of pause length.

Pause length	Pause position				
	Initial	Inside	End	Before-next--tone unit	Total
Brief	240	360	207	54	861
Unit	455	228	119	39	841
Double	108	51	30	12	201
Treble	31	12	10	9	62
Total	834	651	366	114	1965

Table 3.21 Summary of the distribution of pause lengths over pause positions.

Pause length	Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	240	28.8
Unit	455	54.5
Double	108	13.0
Treble	31	3.7
Total	834	100.0

Table 3.22 Proportions of pause lengths in the initial position.

Pause length	Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	360	55.3
Unit	228	35.1
Double	51	7.8
Treble	12	1.8
Total	651	100.0

Table 3.23 Proportions of pause lengths in the inside position.

Pause length	End Position	
	Absolute frequency	Relative frequency (%)
Brief	207	56.5
Unit	119	32.5
Double	30	8.1
Treble	10	2.7
Total	366	100.0

Table 3.24 Proportions of pause lengths in the end position

Pause length	Before-next-tone-unit Position	
	Absolute frequency	Relative frequency (%)
Brief	54	47.3
Unit	39	34.2
Double	12	10.5
Treble	9	8.0
Total	114	100.0

Table 3.25 Proportions of pause lengths in the before-the-next-tone position

Pause Position	Pauses	
	Absolute frequency	Relative frequency (%)
Initial	834	42.4
Inside	651	33.1
End	366	18.7
Before next tone unit	114	6.8
Total	1965	100.0

Table 3.26 Proportions of pauses in all positions.

Pause length	Fall Initital Position	
	Absolute frequency	Relative frequency (%)
Brief	107	29.6
Unit	200	55.5
Double	41	11.3
Treble	13	3.6
Total	361	100.0

Table 3.27 Pauses in the initial position by fall nuclear tone type.

Pause length	Fall Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	157	57.9
Unit	93	34.3
Double	15	5.5
Treble	6	2.3
Total	271	100.0

Table 2.28 Pauses in the inside position by fall nuclear tone type.

Pause length	Fall End Position	
	Absolute frequency	Relative frequency (%)
Brief	65	61.3
Unit	30	28.3
Double	6	5.6
Treble	5	4.7
Total	106	100.0

Table 2.29 Pauses in the end position by fall nuclear tone type.

Pause length	Fall Before-next-tone-unit Position	
	Absolute frequency	Relative frequency (%)
Brief	20	45.4
Unit	16	36.4
Double	5	11.4
Treble	3	6.8
Total	44	100.0

Table 3.30 Pauses in the before-the-next-tone unit position by fall nuclear tone type.

Pause Position	Fall	
	Absolute frequency	Relative frequency (%)
Initial	361	46.1
Inside	271	34.6
End	106	13.5
Before next tone unit	44	5.6
Total	782	100.0

Table 3.31 Summary of pause position by fall nuclear tone type.

Pause length	Narrow Fall Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	9	39.1
Unit	8	34.8
Double	4	17.4
Treble	2	8.7
Total	23	100.0

Table 3.32 Pauses in the initial position by narrow fall nuclear tone type.

Pause length	Narrow Fall Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	13	62.0
Unit	6	28.5
Double	2	9.5
Treble	0	0
Total	21	100.0

Table 3.33 Pauses in the inside position by narrow fall nuclear tone type.

Pause length	Narrow Fall End Position	
	Absolute frequency	Relative frequency (%)
Brief	10	77.0
Unit	2	15.3
Double	1	7.7
Treble	0	0
Total	13	100.0

Table 3.34 Pauses in the end position by narrow fall nuclear tone type.

Pause length	Narrow Fall Before-next-tone-unit Position	
	Absolute frequency	Relative frequency (%)
Brief	1	50.0
Unit	1	50.0
Double	0	0
Treble	0	0
Total	2	100.0

Table 3.35 Pauses in the before-the-next-tone unit position by narrow fall nuclear tone type.

Pause Position	Narrow Fall	
	Absolute frequency	Relative frequency (%)
Initial	23	38.9
Inside	21	35.6
End	13	22.1
Before next tone unit	2	3.4
Total	59	100.0

Table 3.36 Summary of pause position by narrow fall nuclear tone type.

Pause length	Rise Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	6	35.4
Unit	10	58.8
Double	0	0
Treble	1	5.8
Total	17	100.0

Table 3.37 Pauses in the initial position by rise nuclear tone type.

Pause length	Rise Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	0	0
Unit	0	0
Double	1	100.0
Treble	0	0
Total	1	100.0

Table 3.38 Pauses in inside position by rise nuclear tone type.

Pause length	Rise End Position	
	Absolute frequency	Relative frequency (%)
Brief	1	50.0
Unit	1	50.0
Double	0	0
Treble	0	0
Total	2	100.0

Table 3.39 Pauses in the end position by rise nuclear tone type.

Pause Position	Rise	
	Absolute frequency	Relative frequency (%)
Initial	17	85.0
Inside	1	5.0
End	2	10.0
Before next tone unit	0	0
Total	20	100.0

Table 3.40 Summary of pause position by rise nuclear tone type.

Pause length	Terminal Rise Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	64	28.5
Unit	110	48.8
Double	41	18.3
Treble	10	4.4
Total	225	100.0

Table 3.41 Pauses in the initial position by terminal rise nuclear tone type.

Pause length	Terminal Rise Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	98	53.6
Unit	64	35.0
Double	19	10.4
Treble	2	1.0
Total	183	100.0

Table 3.42 Pauses in the inside position by terminal rise nuclear tone type.

Pause length	Terminal Rise End Position	
	Absolute frequency	Relative frequency (%)
Brief	48	46.2
Unit	37	35.6
Double	15	14.4
Treble	4	3.8
Total	104	100.0

Table 3.43 Pauses in the end position by terminal rise nuclear tone type.

Pause length	Terminal rise Before-the-next-tone-unit-Position	
	Absolute frequency	Relative frequency (%)
Brief	15	51.7
Unit	12	41.4
Double	1	3.4
Treble	1	3.4
Total	29	100.0

Table 3.44 Pauses in the before-the-next-tone unit position by terminal rise nuclear tone type.

Pause Position	Terminal Rise	
	Absolute frequency	Relative frequency (%)
Initial	225	41.6
Inside	183	33.8
End	104	19.2
Before next tone unit	29	5.4
Total	541	100.0

Table 3.45 Summary of pause position by terminal rise nuclear tone type

Pause length	Level Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	36	29.5
Unit	71	58.2
Double	13	10.6
Treble	2	1.6
Total	122	100.0

Table 3.46 Pauses in the initial position by level nuclear tone type.

Pause length	Level Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	51	54.8
Unit	34	36.5
Double	7	7.5
Treble	1	1.2
Total	93	100.0

Table 3.47 Pauses in the initial position by level nuclear tone type.

Pause length	Level End Position	
	Absolute frequency	Relative frequency (%)
Brief	55	62.5
Unit	28	31.8
Double	4	4.5
Treble	1	1.1
Total	88	100.0

Table 3.48 Pauses in the end position by level nuclear tone type.

Pause length	Level Before-the-next-tone-unit Position	
	Absolute frequency	Relative frequency (%)
Brief	9	34.6
Unit	9	34.6
Double	4	15.4
Treble	4	15.4
Total	26	100.0

Table 3.49 Pauses in the before-the-next-tone unit position by level nuclear tone type.

Pause position	Level	
	Absolute frequency	Relative frequency (%)
Initial	122	37.1
Inside	93	28.3
End	88	26.7
Before next tone unit	26	7.9
Total	329	100.0

Table 3.50 Summary of pause position by terminal rise nuclear tone type.

Pause length	Fall-Rise Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	11	23.4
Unit	30	63.8
Double	5	10.6
Treble	1	2.1
Total	47	100.0

Table 3.51 Pauses in the initial position by fall-rise nuclear tone type.

Pause length	Fall-Rise Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	25	48.0
Unit	21	40.4
Double	4	7.7
Treble	2	3.9
Total	52	100.0

Table 3.52 Pauses in the inside position by fall-rise nuclear tone type.

Pause length	Fall-Rise End Position	
	Absolute frequency	Relative frequency (%)
Brief	18	54.5
Unit	14	42.4
Double	1	3.1
Treble	0	0
Total	33	100.0

Table 3.53 Pauses in the end position by fall-rise nuclear tone type.

Pause length	Fall-Rise Before-next-tone-unit Position	
	Absolute frequency	Relative frequency (%)
Brief	2	50.0
Unit	1	25.0
Double	1	25.0
Treble	0	0
Total	4	100.0

Table 3.54 Pauses in the before-the-next-tone unit type by fall-rise nuclear tone type.

Pause position	Fall-Rise	
	Absolute frequency	Relative frequency (%)
Initial	47	34.5
Inside	52	38.2
End	33	24.2
Before next tone unit	4	3.1
Total	136	100.0

Table 3.55 Summary of pause position by fall-rise nuclear tone type.

Pause length	Male Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	119	28.7
Unit	239	57.3
Double	51	12.6
Treble	6	1.5
Total	415	100.0

Table 3.56 Pause length in the initial position by sex: males. Intraindividual differences.

Pause length	Female Initial Position	
	Absolute frequency	Relative frequency (%)
Brief	121	29.1
Unit	216	51.6
Double	57	13.6
Treble	25	5.7
Total	419	100.0

Table 3.57 Pause length in the initial position by sex: Females. Intraindividual differences.

Pause length	Initial Position	
	Male	Female
Brief	119 (49.6)	121 (50.4)
Unit	239 (52.4)	216 (47.6)
Double	51 (47.7)	57 (52.3)
Treble	6 (20.0)	25 (80.0)

Table 3.58 Pause length in the initial position by sex. Interindividual differences.

Pause length	Male Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	213	61.5
Unit	104	30.2
Double	22	6.3
Treble	7	2.0
Total	345	100.0

Table 3.59 Pause length in the inside position by sex: Males. Intraindividual differences.

Pause length	Female Inside Position	
	Absolute frequency	Relative frequency (%)
Brief	147	48.2
Unit	124	40.6
Double	29	9.5
Treble	5	1.6
Total	306	100.0

Table 3.60 Pause length in the inside position by sex: Females. Intraindividual differences.

Pause length	Inside Position	
	Male	Female
Brief	213 (59.2)	147 (40.8)
Unit	104 (45.6)	124 (54.4)
Double	22 (43.1)	29 (56.9)
Treble	7 (58.3)	5 (41.7)

Table 3.61 Pause length in the inside position by sex. Interindividual differences.

Pause length	Male End Position	
	Absolute frequency	Relative frequency (%)
Brief	116	56.6
Unit	64	31.2
Double	21	10.2
Treble	4	2.0
Total	205	100.0

Table 3.62 Pause length in the end position by sex: Males. Intraindividual differences.

Pause length	Female End Position	
	Absolute frequency	Relative frequency (%)
Brief	91	56.5
Unit	55	34.2
Double	9	5.6
Treble	6	3.7
Total	161	100.0

Table 3.63 Pause length in the end position by sex: Females. Intraindividual differences.

Pause length	End Position	
	Male	Female
Brief	116 (56.0)	91 (44.0)
Unit	64 (53.8)	55 (46.2)
Double	21 (70.0)	9 (30.0)
Treble	4 (40.0)	6 (60.0)

Table 3.64 Pause length in the end position by sex.

Interindividual differences.

Pause length	Male Before-next-tone unit position Absolute frequency	Relative frequency (%)
Brief	25	58.2
Unit	14	32.5
Double	3	7.0
Treble	1	2.3
Total	43	100.0

Table 3.65 Pause length in the before-next-tone unit position by sex: Males. Intraindividual differences.

Pause length	Female Before-next-tone unit position Absolute frequency	Relative frequency (%)
Brief	29	40.8
Unit	25	35.2
Double	9	12.7
Treble	8	11.3
Total	71	100.0

Table 3.66 Pause length in the before-next-tone unit position by sex: Females: Intraindividual differences.

Pause length	Before-next-tone unit position	
	Male	Female
Brief	25 (46.3)	29 (53.7)
Unit	14 (36.0)	25 (64.0)
Double	3 (25.0)	9 (75.0)
Treble	1 (11.2)	8 (88.8)

Table 3.67 Pause in the next-tone unit position by sex. Interindividual differences.

Pause Position	Male Pauses	
	Absolute frequency	Relative frequency (%)
Initial	415	41.2
Inside	345	34.2
End	205	20.3
Before-next-tone unit	43	4.3
Total	1008	100.0

Table 3.68 Pause position by sex: Males. Intraindividual differences.

Pause Position	Female Pauses	
	Absolute frequency	Relative frequency (%)
Initial	419	43.8
Inside	306	32.0
End	161	16.8
Before-next-tone unit	71	7.4
Total	957	100.0

Table 3.69 Pause position by sex: Females. Intraindividual differences.

Pause Position	Pauses	
	Male	Female
Initial	415 (49.8)	419 (50.2)
Inside	345 (53.0)	306 (47.0)
End	205 (56.0)	161 (44.0)
Before-next-tone unit	43 (37.7)	71 (62.3)

Table 3.70 Pause position by sex. Interindividual differences.

CHAPTER IV

SUMMARY AND CONCLUSIONS

4.1 SUMMARY

The nuclear tone types investigated in this study occurred in the following proportions: fall 47.3%, terminal rise 24.6%, level 15.3%, fall-rise 7.4%, rise 3.0%, fall-plus-rise 1.5%, rise-fall 0.7% and rise plus-fall 0.2%. Of all the tone types girls used more falls, wide rises, levels, narrow rise-falls, fall-rises, wide fall-rises, and narrow-fall-rises than boys. Boys used more wide falls, narrow falls, rises, narrow rises, terminal rises, rise-falls, wide rise-falls, and narrow rise-plus-falls than girls.

Tone unit length ranged from one to 18 words with an average of four words. 80.0% of all tone units were between one and seven words long. The following nuclear tones were contained in tone units which were four words in length the majority of the time: narrow fall, fall-plus-rise, level, terminal rise and fall. Rise-fall tone units had an equal percentage of tone units of three and four words, while rise tone units were primarily one word in length. Boys and girls used tone units of one, three, five, eight, nine and ten words in comparable proportions, but boys used tone units of four and six words more than girls.

Tone unit head length in words ranged from one to ten words with an average of 2.9 words. Overall heads were present in tone units 66.5% of the time. Of all the tone units with heads, those containing narrow-fall and fall-rise tones

had heads present the most, followed by terminal rise, fall, level and fall-plus-rise tone units. Boys used slightly more heads than girls.

Preheads were present in tone units 73.5% of the time. Fall-rise and fall-plus-rise had preheads present the most, followed by fall, narrow fall, level, terminal rise, fall-rise and rise tone units. Boys and girls used tone unit preheads in comparable proportions. Tails were present in tone units 21.7% of the time. Boys and girls used tails in comparable proportions.

Pause length and pause position in the tone unit was examined. Over all brief pauses were used 43.8%, unit pauses 42.8%, double pauses 10.3% and treble pauses 3.1% of the time. Most pauses were recorded in the initial position over the whole sample, 42.4%, while the inside position recorded 33.1%, the end position 18.7% and the before-the-next-tone unit position recorded 5.8%. In the initial position over the entire sample unit pauses accounted for 54.5%, brief pauses 28.8% double, 13.0% and treble 3.6%. In the inside position brief pauses were used 55.3% of the time unit pauses 35.1%, double pauses 7.8% and treble pauses 1.8%. In the end position brief pauses were used 56.5%, unit pauses 32.5%, double pauses 8.1% and treble pauses 2.7%. In the before-the-next-tone unit position brief pauses were used 47.3%, unit pauses 34.2%, double pauses 10.5% and treble pauses 8.0%.

For the 492 tone units containing terminal rises 541 pauses were recorded. 41.6% of these were in the initial position, 33.8% in the inside position, 19.2% in the end

position and 5.4% in the before-the-next-tone unit position. For the 306 level tone units 328 pauses were recorded. 37.1% of these were in the initial position, 28.3% in the inside position, 26.7% in the end position and 7.9% in the before-the-next-tone unit position. For the 130 fall-rise tone units 136 pauses were recorded. Of that, 38.2% were in the initial position, 34.5% in the inside position 24.2% in the end position and 3.1% in the before-the-next-tone unit position. For 861 fall tone units 782 pauses were recorded. 46.1% of them were in the initial position, 34.6% in the inside position, 13.5% in the end position and 5.6% in the before-the-next-tone unit position. For the 42 rise tone units 20 pauses were recorded. 85.0% were in the initial position, 5.0% were in the inside position and 10.0% were in the end position.

Over the entire sample boys recorded more pauses than girls with 51.3% and 48.7% respectively. Boys recorded more pauses than girls in all positions except the before-the-next-tone unit position. In the initial position girls recorded more brief pauses than boys with 50.4% and 49.6% respectively, more double pauses, 52.3% and 47.7% respectively and more treble pauses, 80.0% and 20.0% respectively. Boys recorded more unit pauses than girls, 52.4% and 47.6% respectively. In the inside position girls recorded more unit and double pauses than boys, with 54.4% and 45.6% and 56.9% and 43.1% respectively. Boys recorded more brief and treble pauses than girls with 59.2% and 40.8% and 58.3% and 41.7% respectively. In the end position girls recorded more treble pauses than boys with 60.0% and 40.0% respectively. Boys recorded more brief pauses than girls, 56.0% and 44,0%,

more unit pauses, 53.8% and 46.2% and more double pauses 70.0% and 30.0%. In the before-the-next-tone unit position girls recorded more pauses, of all lengths; brief pauses, girls, 53.7% and boys 46.3%, unit pauses, girls 64.0% and boys 36.0%, double pauses, girls 75.0% and boys 25.0% and treble pauses girls 88.8% and boys 11.2%.

All results are detailed in Tables 3.1 to 3.70.

4.2 CONCLUSIONS

In this study the terminal rise tone is used in relatively large proportions. It is the next "choice" after a fall nuclear tone. Boys used it slightly more than girls but in comparable proportions. The use of the terminal rise by children, has, up until now, not been documented by contemporary research on intonation. Some speculations have been made regarding its use by adults in American English.

The author speculates that the use of this nuclear tone by children fulfills a particular semantic function. Its use is restricted to situations where it is used by the speaker for seeking confirmation from the listener. The speaker desires to be acceptable to the listener. The terminal rise contour does not necessarily demand a verbal response from the listener; and therefore does not ask that the speaker be interrupted.

The desire to be acceptable is seen by the author, as psychological interaction, where the speaker perceives the listener as superior in either emotional, intellectual or social terms. Age and/or sex differences may, for

example, constitute two variables affecting perceptions of superiority/inferiority. In this study, the subjects are children, the interviewer a strange adult. Speculatively, the variables of age and sex are held to produce, in the subjects, perceptions of unequal status, where the adult interviewer is seen as an authority figure, resulting in the use of the terminal rise nuclear tone. No normative data exists on the use of the terminal rise among children to: one, confirm or deny these views; two, to verify the proportions in which the terminal rise occurred in this sample, or three, even whether the terminal rise is used by children speaking other varieties of English, for example, British or American English.

Generalization to the underlying population is not possible as stated above since the original population from which this sample was drawn, has not been adequately described.

Some of the nuclear tone types investigated in this study occurred in similar proportions to those studies involving adults (see Chapter three), the fall and fall-rise in particular. Additionally, tone unit length was similar as was the number of times in which tone unit heads were present. Given these similarities, Crystal's statement that British children by the age of two and a half use non-segmental (intonation) systems similar to adults, may have relevance not only to the New Zealand children of this sample group but to a wider population of New Zealand children.

Pause phenomena has been documented in the literature as having two functions, the first of which is the biological necessity of inhalation, usually occurring at utterance boundaries. The second function is hesitations due to

various factors such as, searching for an appropriate word, that is, verbal planning, or the indication of a degree of unsureness.

Of the four positions in which pause occurred in this study, it was stated speculatively (Chapter three) that those pauses in the initial, end and before-the-next-tone unit position might indicate both functions, but that those pauses inside the tone unit indicated the second function only, since the tone unit lengths were sufficiently short on average not to require inhalation.

Of the four pause lengths brief pauses and to a lesser extent unit pauses also possibly indicate hesitations of the second function only, because they too are held to be of insufficient length to allow inhalation. The other two pause lengths, double and treble are held to indicate both functions, because of their greater duration. The data show in fact, that more brief and unit pauses occurred in the inside position of the tone unit. Conversely, double and treble pauses occurred more in the other positions of the tone unit thereby lending some empirical support to these speculations.

Of the tone unit types, it was those containing terminal rises which recorded more pauses per tone unit than any other; brief and unit pauses accounted for over 80% of the pauses used. It has just been speculated that brief pauses do not carry the function of inhalation. Given that the terminal rise possibly indicates a desire to be acceptable and also reflects hesitancy in the speaker (Chapter three) it is feasible that its use would be accompanied by more

pausing than other tone types since the brief pause has been held to indicate unsureness.

Finally boys used slightly more pauses over-all than girls. The boys used brief pauses in the inside position and more brief pauses over all positions, which may suggest, given the above speculations, that they were more unsure than girls, or that they had more difficulty with verbal planning.

It has been admitted that these conclusions are largely speculative and that they would need substantially more empirical investigation. Valid conclusions could not in any case be drawn from this sample; this point is discussed in the final chapter.

CHAPTER V

LIMITATIONS OF THE PRESENT ENQUIRY

The major limitation of this enquiry concerns the sample group. The population from which the sample was drawn was not adequately described by the original researcher and consequently generalizations from the results of this study to the underlying population are not possible.

The size of this sample is, for example, too small for the results to be representative. The sample also comprised Europeans only. Larger numbers of children, adequately described and representing more than one cultural group would be necessary for normative purposes.

The sample was utilized in this study however, since; in the almost complete absence of data about almost all aspects of the prosodic systems used by New Zealand children (Hawkins excepted), the main aim at this time was to make a preliminary analysis and not a definitive study. It was judged that the sample group would yield prosodic data useful to such a preliminary investigation. Such substantiation for this judgement has been provided by the data, some prosodic features of which have shown regularities with the data from existing research (Chapter three).

The actual interview situation in which the original data were elicited was highly specific and results may, therefore, be due to these conditions alone.

A subsequent research design, involving children in interview situations (adequacy of the sample apart) would

need, for example, to compare situational variables such as familiar interviewer versus stranger, visibility versus non-visibility of recording equipment, and differences in the social, educational, psychological and linguistic pragmatics of the particular situation.

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REFERENCES

Allen, W. Stannard. (1954) Living English Speech: Stress and Intonation for Foreign Students. London: Longmans.

Armstrong, L.E., and Ward, I.C. (1926) Handbook of English Intonation. Leipsig and Berlin: Teubner; Cambridge: Heffer, 1931. Cambridge: Cambridge University Press.

Arnold, G.E. (1961) "Phylogenetic evolution and ontogenetic development of language". Logos. 4, 86-99.

Artemov, V.A. (1978) "Intonation and Prosody". Phonetica. 35, 301-39.

Bar-adon, A., and Leopold, W. (1971) Child Language: A Book of Readings. Englewood Cliffs.

Beattie, G.W., and Butterworth, B.L. (1979). "Contextual probability and word frequency as determinants of pause and errors in spontaneous speech". Language and Speech. 22, 201-13.

Benda, R. (1967) "The significance of babbling to language development. A study of the intonation patterns of an eight-month-old child". (ERIC Abstract).

Bernstein, B. (1962) "Linguistic Codes, hesitation phenomenon and intelligence". Language and Speech. 5, 31-46.

Bever, T.G., Fodor, J.A., and Weskel, W. (1965) On the acquisition of syntax: a critique of "contextual generalization". Psychological Review. 72, 467-82.

Blankenship, J., and Kay, C. (1964) "Hesitation Phenomenon in English Speech". Word. 20, 360-72.

Blanton, M.G. (1917) "The behaviour of the human infant during the first thirty days of life". Psychological Review. 24, 456-83.

Bloch, B., and Trager, G.L. (1942) Outline of Linguistic Analysis. Baltimore: Special Publication of the Linguistic Society of America.

Bloom, L. (1973). One word at a time. The Hague.

Bloomfield, L. (1933) Language. New York: Holt.

Bolinger, D.L. (1945) "The minimising downskip." American Speech. 20, 40-4.

_____ (1946) "The intonation of quoted questions". Quarterly Hournal of Speech. 32, 197-200

_____ (1947) "Comments on Pike's "American English Intonation"", Studies in Linguistics. 5, 69-78.

_____ (1948) "Intonation of accosting questions". English Studies. 29, 109-14.

_____ (1949) "Intonation and Analysis". Word. 5, 248-54.

_____ (1951) "Intonation - levels v. Configurations" Word. 7, 199-210.

_____ (1954) "Intonation as stress carrier". Litera. 1, 35-40.

_____ (1957a) "On certain functions of accents A and B." Litera (Instabul). 4, 80-9.

_____ (1957b) "English stress: the interpretation of strata". Study of Sounds (Tokyo). 5, 295-315.

_____ (1958a) "A theory of pitch accent in English". Word. 14, 109-49.

_____ (1958b) "Stress and Information". American Speech. 33, 5-20.

_____ (1958c) "On intensity as a qualitative improvement of pitch accent." Lingua. 7, 175-82.

_____ (1958d) "Intonation and grammar". Language Learning. 8, 31-7.

_____ (1958e) "Interrogative structures of American English". Proceedings of the American Dialect Society 28.

_____ (1961a). "Contrastive accent and contrastive stress". Language. 37, 83-96.

_____ (1961b) "Ambiguities in pitch accent". Word. 17, 309-17.

_____ (1964a) Around the Edge of Language: Intonation. Cambridge, Massachusetts: Harvard Educational Review. 34, 282-96.

Boomer, D.S. (1965) "Hesitation and grammatical encoding". Language and Speech. 8, 148-58.

_____ and Dittman, A.T. (1962) "Hesitation Pauses and juncture pauses in speech". Language and Speech. 5, 215-20.

Bosma, J.F., and Fletcher, S.G. (1961) "Comparison of pharyngeal action in infant cry and mature phonation". Logos. 4, 100-117.

Brend, R.M. (1972) "Male and Female Intonation Patterns in American English". in Proceedings of the 7th International Congress of Phonetic Sciences. Ed Rigault, A., and Charbonneau, R. The Hague: Mouton. 866-870.

Brooks, R., Brandt., L., and Wiener, M. (1969) "Differential Response to two communication channels: Socioeconomic class differences in response to verbal reinforcers communicated with and without tonal inflection." Child Development. 40, 453-70.

Brouwer, D., Gerritzen, M., and De Haan, D. (1979) "Speech differences between women and men: on the wrong track?" Language in Society. 8, 33-50.

Burling, R. (1966). "The metrics of children's verse: a cross-linguistic study". American anthropology. 68, 1418-41.

Butler, C. (1633) The English grammar. London.

Butterworth, B.L. (1975) "Hesitation and Semantic Planning in Speech". Journal of Psycholinguistic Research. 4, 75-87.

Cameron, J., Livson, N., and Bayley, N. (1967) "Infant vocalization and their relationship to mature intelligence". Science. 157, 331-3.

Carlson, P., and Anisf eld, M. (1969) "Some observations on the Linguistic competance of a two-year-old child". Child Development. 40, 569-75.

Crosby, F., and Nyquist, L. (1977) "The female register: an empirial study of Lakoff's hypothesis. Language in Society. 6, 313-322.

Crystal, D. (1963). "A perspective for paralanguage". Le Maître Phonétique. (London). 120, 25-9.

_____ (1964) "An approach to a reply". Le Maître Phonétique. 122, 23-4.

_____ (1969) Prosodic Systems and Intonation in English.

_____ (1975) The English Tone of Voice. London: Edward Arnold.

_____ and Davy, D. (1969) Investigating English Style. London: Longmans.

_____ (1975) Advanced Conversational English. London: Longmans.

Crystal, D., and Quirk, R. (1964) Systems of Prosodic and Paralinguistic features in English. The Hague: Mouton.

Dale, P.S. (1974) "Hesitations in Maternal Speech". Language and Speech. 17, 174-181.

Danes, F. (1960) "Sentence Intonation from a functional point of view". Word. 16, 34-54.

Darwin, C. (1877). "A bibliographical sketch of an infant". Mind. 2, 285-94.

Davy, D. (1968) Material collected for an M.A. thesis entitled "A study of Intonation and Analogous Features as Exponents of Stylistic Variation, with Special Reference to a Comparison of Conversation with written English Read aloud." and received by personal communication.

_____ and Quirk, (1969). "An acceptability experiment with spoken output". Journal of Linguistics. 5, 109-20.

Denes, P., and Mitton-Williams, J. (1962) "Further Studies in Intonation". Language and Speech. 5, 1-14.

Delacroix, H. (1934) L'enfant et le Langage. (Paris).

Dittrichová, J., and Lapáčková, V. (1964) "Development of the waking state in young infants". Child Development. 35, 365-70.

Eakins, B., and Eakins, C. (1978) Sex Differences in Human Communication. Boston: Houghton Mifflin.

Edelsky, C. (1979) "Question Intonation and Sex Roles". Language in Society. 8, 15-33.

Eisenson, J. (1966) "Developmental patterns of non-verbal children and some therapeutic implications." Journal of Neurological Science. 3, 313-20.

Ervin-Tripp, S. (1964) "An analysis of the interaction of language, topic, and listener". American Anthropology. 66, 86-102.

Esposito, A. "Sex differences in children's conservations". Language and Speech. 22, 213-220 (1979).

Esser, J. "Contrastive Intonation of German and English". Phonetica. 35, 41-55, 1978.

Fairbanks, G., Wiley, J.H., and Lassman, F.M. (1949). "An acoustical study of vocal pitch in seven-and eight-year-old boys". Child Development. 20, 63-9.

Fant, G. (1960) Acoustical Theory of Speech Production. The Hague: Mouton.

Fisichelli, V.R., and Karelitz, S. (1963). "The cry latencies of normal infants and those with brain damage". Journal of Pediatrics. 62, 724-34.

Flavell, J.H. (1968) The Development of Role-Taking and Communication Skills in Children. New York.

Freidlander, B.Z. (1968). "The effect of speaker identity, voice inflection, vocabulary, and message redundancy on infant's selection of vocal reinforcement". Journal of Experimental Child Psychology. 6, 443-59.

Fromkin, V.A. (Ed) Tone: A Linguistic Survey. New York: New York Academic Press.

Goldman-Eisler, F. (1954) "On the variability of the speed of talking and on its relation to the length of utterances in conversation". British Journal of Psychology. 45, 94-107.

_____ (1955) "Speech-breathing activity: a measure of tension and affect during interviews". British Journal of Psychology. 46, 53-63.

_____ (1956a) "The determinants of the rate of Speech output and their mutual relations". Journal of Psychosometic Research. 1, 137-43.

_____ (1956b) "Speech-breathing activity and content in psychiatric interviews". British Journal of Mecical Psychology. 29, 35-48.

_____ (1958a) "Speech analysis and mental processes". Language and Speech. 1, 59-75.

_____ (1958b) "The predictability of words in context and the length of pauses in speech". Language and Speech. 1, 226-31.

_____ (1961a) "A comparative study of two hesitation phenomena". Language and Speech. 4, 18-26.

_____ (1961b) "The significance of changes in the rate of articulation". Language and Speech. 4, 171-4.

_____ (1961c) "Continuity of speech utterance, its determinants and significance". Language and Speech. 4, 220-31.

_____ (1961d) "The distribution of pause durations in Speech." Language and Speech. 4, 232-7.

_____ (1967) "Sequential temporal patterns and cognitive processes in speech." Language and Speech. 10, 122-32.

Goudie, K.M. (1979) "A study of intonation and pause in a group of Expository monologues". Dissertation abstracts International.

Gunter, R. "Intonation and Relevance." in D. Bolinger, (1972). (Ed). Intonation. pp194-215.

Haas, M.B., and Harms, L.E. (1963) "Social interaction between infants". Child Development. 34, 79-97.

Hadding, K., and Studdert-Kennedy, M. (1974) "Are you asking me, telling me or talking to yourself?" Journal of Phonetics. 2, 7-14.

Halliday, M.A.K. (1961) "Categories of the theory of grammar". Word. 17, 241-92.

_____ (1963). The Tones of English." Archivum Linguisticum. 15, 1-28.

_____ (1964) "Intonation in English grammar". Transactions of the Philological Society. ppl43-69.

_____ (1966) "Intonation Systems in English" in Patterns of Language: papers in general, descriptive and applied linguistics. eds. A. MacIntosh and M.A.K. Halliday. London: Longmans. ppll-33.

_____ (1967) Intonation and grammar in British English. The Hague: Mouton.

_____ (1970) A course in spoken English: Intonation London: Longmans.

_____ (1974) "A sociolinguistic perspective on language development". Bulletin S.O.A.S. 37, 98-118.

_____ (1975) Learning How to Mean - Explorations in the Development of Language. London: Edward Arnold.

Hall, R.S. (1891) "Notes on the Study of Infants". Pediatric Seminars. 1, 127-38.

Hart, J. (1569) The opening of the unreasonable writing of our inglish toung. In Danielsson, B. (1963) "John Hart's works on English orthography and pronunciation". Part 2, Phonology. Stockholm: Almqvist and Wiksell.

Hart, J., and Cohen, A. (1973) "Intonation by Rule. A perceptual Quest." Journal of Phonetics. 1, 309-27.

Hawkins, P.R. "The syntactic location of hesitation pauses." Language and Speech. 14, 277-88,1971.

Hegedüs, L. (1953). "On the problem of Pauses of Speech." Acta Linguistica. 3, 1-34.

Henderson, A.I., and Nelms, S. (1976) "Relative salience of Intonation fall and pause as cues to the perceptual segmentation of speech in an unfamiliar language" Language. 50.

Herbert, E.L., and Hammond, J.M. (1949) "An acoustical study of vocal pitch in seven-and-eight-year-old boys." Child Development. 20, 71-80.

Hill, A.A. (1955) "Linguistics since Bloomfield". Quarterly Journal of Speech. 41, 253-60.

Hoyer, A., and Hoyer, I. (1924) "Über die lallsprache eines kindes." Z. Angew. Psychology. 24, 363-84.

Jassem, W. (1949) "Indication of speech rhythm in the transcription of educated Southern British ." Maître Phonétique. 92, 22-4.

Jones, D. (1909) Intonation Curves. Leipzig and Berlin: Teubner.

Kaplan, L. (1973) "Speech registers in young children". Child Development. 44, 63-78.

_____ and Kaplan, G.A. (1970) "Is there any such thing as a prelinguistic child?", in Eliot, J. (Ed.) Human Development and Cognitive Processes. New York: New York University Press.

Karelitz, S., and Fischelli, V. (1962) "The cry thresholds of normal infants and those with brain damage" Journal of Pediagrics. 61, 679-85.

Karelitz, S., Fisichelli, V., Costa, J., Karelitz, R., and Rosenfeld, L. (1964) "Relations of crying activity in early infancy to speech and intellectual development at age three years". Child Development. 35, 769-77.

Kononova, I.M. (1968) "Vocal responses in children in the first year of life and their relation to various patterns of behaviour". Transported from Vopr. Psikhol. 5, 119-27. (in LLBA, 1969, 669).

Key, M.R. (1975) Male/Female Language Metuchen, New Jersey: Scarecrow Press.

Kingdon, R. (1958a) Groundwork of English Intonation. London: Longmans.

Klinghardt, H. (1923, 2nd Edn.) Sprechmelodie und Sprechtakt. Marburg.

Koberski, E. (1979) A cross-Cultural study of the intonation of utterances in "conventional" situations. Revue de Phonétique. 51, 123-153.

_____ (1979) The intonation of utterances in "conventional" situations". Revue de Phonétique. 52, 201-245.

Kowal, S., O'Connell, D.C., and Sabin, E.J. (1975) "Development of temporal patterning and vocal hesitations in spontaneous narrations". Journal of Psycholinguistic Research. 4, 195-207.

Lakoff, R. (1973) "Language and woman's place". Language in Society. 2, 45-80.

Lee, L. (1974) Developmental sentence analysis. Evanston: Northwestern University Press.

Lee, W.R. (1956c) Fall-Rise Intonation in English". English Studies. 37, 32-72.

_____ (1956b) "English Intonation: a new approach". Lingua. 5, 345-371.

Lehiste, I. (1970) Superasegmentals. Cambridge, Massachusetts. M.I.T. Press.

Lenne berg, E.H. (1964) "Language disorders in childhood." Harvard Education Review. 34, 152-77.

_____ , Rebelsky, F.F., and Nichols, I.A. (1965) "The vocalizations of infants born to deaf and to hearing parents". Human Development. 8, 23-37.

Leopold, W.F. (1947,1949) Speech development in bilingual child 1,2. Evanston.

Levin, H., and Silverman, I. (1965) "Hesitation phenomenon in children's speech". Language and Speech. 8, 67-85.

_____, Silverman, I., and Ford, B.L. (1967) "Hesitation in children's speech during explanation and description." Journal of Verbal Learning and Verbal Behaviour. 6, 560-4.

Lewis, M.M. (1936) Infant Speech: A Study of the Beginnings of Language. New York: New York Press.

Lieberman, P. (1965). "On the acoustic basis of the perception of intonation by linguists." Word. 21, 40-54.

_____ (1967) Intonation, Perception and Language. Cambridge, Massachusetts: M.I.T. Press.

Ling, A.H. (1965) "Early stages in the development of speech in hearing and deaf babies". Voice. 8, 12-18.

Lounsbury, F.G. (1954) "Pausal, Juncture and hesitation phenomena" in Osgood, C.E., and Sebeok T.A. Psycholinguistics: A survey of theory and research problems. Indiana: Indiana University Press.

Luschsinger, R., and Arnold, G.E. (1965) Voice - Speech - Language. Trans. G.E. Arnold and E.R. Finkbeiner. Belmont and London.

Lynip, A.W. (1951) "The use of magnetic devices in the collection and analysis of the preverbal utterances of an infant". Genetic Psychological monograph. 44, 221-262.

Maclay, H., and Osgood C.E. (1959) "Hesitation phenomenon in Spontaneous English Speech". Word. 15, 19-44.

Martin, J.G. (1970) "On Judging Pauses in Spontaneous Speech". Journal of Verbal Learning and Verbal behaviour. 9, 75-78.

Massengill, R.M. (1969) "Cry characterists in cleft-palate neonates" Journal of the Acoustical Society of America. 45, 782-4.

Menyuk, P. (1969) "Prosodic features and children's language production. MIT, QPR. 93, 216-19.

McNeil, D. (1966) Developmental Psycholinguistics in Smith and Miller pp.15-84.

Moynihan, I. (1979) "A comparative study of the language used by New Zealand children of European and of Samoan descent age 6 years 10 months to 8 years in conversation with an adult." Ph.D. thesis; Massey University, New Zealand.

Murai, J.I. (1960) "Speech development in infants: analysis of speech sounds by sona-graph". Psychologia. 3, 27-35.

Murdock, J.E. (1884) Analytic Elocution. New York: Van Antwerp, Bragg and Co.

Napoli, D.J. ed. (1978) Elements of Tone, Stress and Intonation. Washington, D.C.: Georgetown University Press.

O'Connor, J.D. (1951) "Styles of English Pronunciation". English Language Teaching. 6, 158-62.

_____ (1954) A course of English Pronunciation. Amsterdam: Meulenhoff.

_____(1956) English Intonation. Stockholm: Almqvist and Wiksell.

_____ and Arnold, G.F. (1961). Intonation of Colloquial English. London: Longmans.

Omond, T.S. (1921) English metrists, being a stretch of English prosodical criticism from Elizabethan times to the present day. Oxford: Clarendon Press.

Painter, C. (1971) "Archetypal breath - groups and the motor theory of speech perception: evidence from a register tone language." Anthropological Linguistics. 13, 349-60.

Palmer, H.E. (1922) English intonation, with systematic exercises. Cambridge: Heffer.

Pellowe, J., and Jones, V. (1979) "Establishing Intonationally variable systems in a multidimensional Linguistic Space." Language and speech. 22, 97-117.

Pike, K.L. (1944) Phonetics. Ann Arbor: University of Michigan Press.

_____ (1945) The intonation of American English. Ann Arbor: University of Michigan Press.

_____ (1949) "Controlled infant intonation". Language Learning. 2, 21-4.

Quirk, R. (1960) "Towards a description of English Usage." Transactions of the Philological Society. pp.40-61.

_____ The use of English. London: Longmans.

_____ and Crystal, D. (1966) "On scales of contrast in English connected speech." In Memory of F.R. Firth, ed. C.E. Bazell et al. London: Longmans. pp359-69.

_____ and Duckworth, A.P., Svartvik, J., Ruslecki, J.P.L., and Colin, A.J.T. (1964) "Studies in the correspondence of prosodic to grammatical features in English." in Proceedings of the Ninth International Congress of Linguists, Boston 1962. The Hague: Mouton.

Ripman, W. (1922). Good speech, an introduction to English Phonetics. New York: Dutton.

Robinson, W.P. (1972) Language and Social Behaviour. Harmondsworth.

Rochester, S.R. (1973) "The Significance of Pauses in Spontaneous Speech." Journal of Psycholinguistic Research. 2, 51-83.

Routh, D.K. (1969) "Conditioning of vocal response differentiation in infants." Developmental Psychology. 1, 219-26.

Rush, J. (1827) The Philosophy of the Human Voice. Philadelphia: Library Co.

Schubiger, M. (1935) The Role of Intonation in Spoken English. Cambridge: Heffer.

_____ (1958) English Intonation, its Form and Function. Tübingen: Max Niemeyer.

Seligman, C.R., Tucker, G.R., and Lambert, W.E. (1970). "The effects of speech style on teachers attitudes towards pupils". mimeo, McGill University.

Sharp, A.E. (1958) "Falling-Rising Intonation patterns in English." Transactions of the Philological Society. pp.104-35.

Shepard, R.N. (1964) "Circularity in judgements of relative pitch". Journal of the Acoustical Society of America. 56, 2346-53.

Shinn, M.W. (1900) The biography of a baby. New York: Dutton.

Stierman, G.G., and Tidesley, D. (1979) "The effect of word length and frequency of articulation and Pausing during Delayed Auditory Feedback". Language and Speech. 2 191-200.

Steele, J. (1775) An essay towards establishing the melody and measure of speech, to be expressed and perpetuated by certain symbols. London: Bowyer and Nichols.

Stern, C., and Stern, W. 1928. Die Kindersprache:Leipzig, 4th edition.

Sweet, H. (1878) Handbook of Phonetics. Oxford: Clarendon Press.

Taine, H. (1877). "M. Taine on the acquisition of language by children". Translated from Revue de Philosophie 1., In Mind. 2, 252-9.

Thorne, B., and Henley N. (1975) eds. Language and sex: difference and dominance. Rowley Massachusetts: Newbury House.

Todd, G.A., and Palmer B. (1968) "Social reinforcement of infant babling" Child Development. 39, 591-6.

Tonkova-Yampolskaya, R.V. (1962) "On the question of studying physiological mechanisms of speech". Pavlovian Journal of Higher Nervous activity. 12, 82-7.

Tosi, O., Singh, J., and Takefuta, Y. (1966) "A study of Pauses in oral reading of one's native language and English" Language and Speech. 9, 237-41.

Trim, J.L.M. (1959) "Major and minor tone-groups in English". Maître Phonétique. 112, 26-9.

Trojan, F. (1957) "General semantics." in Manual of Phonetics, ed Kaiser. L. Amsterdam: North Holland Publishing Company. pp437-9.

Truby, H.M. (1960) "Some aspects of the acoustical and cineradiographic analysis of newborn-infant and adult phonation and associated vocal tract activity". Journal of the Acoustical Society of America. 32, 1518.

Van Riper, C. (1963) 4th edition. Speech correction: principles and methods. Englewood Cliffs, New Jersey: Prentice Hall.

Walker, J. (1787) The melody of Speaking, delinated; or elocution taught like music, by visible signs, adapted to the tones, inflexions, and variations of voice in reading and speaking, with directions for modulation, and expressing the passions ... London. (published for the author).

Weeks, T. (1971) "Speech registers in young Children" Child Development. 42, 1119-31.

Weir, R. (1962) Language in the crib. The Hague: Mouton.

Wolff, P.H. (1959) "Observations on newborn infants". Psychosometric medicine. 21, 110-118.

ADDENDUM TO REFERENCES

Arnold, G.F. (1952) "Context in English Intonation teaching". Le Maître Phonétique. 97, 9-11.

Bodine, A. (1977) "M. Key: Male/female language". Language in Society. 6, 104-110.

Bolinger, D. (1952) "Linear Modification". Publications of the Modern Language Association of America. 42, 1117-44.

_____ (1955a) "intersections of stress and Intonation." Word. 11, 195-203.

_____ (1955b) "The melody of language". Modern language Forum. 40, 19-30 (Los Angeles).

_____ (1959) "Review of M. Schubiger, English intonation, its form and function" in American Speech. 34, 197-201.

Breton, R. (1665) in Dictionaire Caraibe-François Auxerre. Reprinted by Jules Platzman 1892.

Cook, V. (1968) Active Intonation. London: Longmans.

Eylan, O.H. (1977) "Sex differences in speech style". Paper presented at the First European conference on Sex Role Stereotyping. Cardiff.

Fairbanks, S.G. (1942) "An acoustical study of the pitch of infant hunger wails". Child Development. 13, 227-32.

Fairbanks, S.G. (1950) "An acoustical comparison of vocal pitch in seven- and eight-year-old children". Child Development. 21, 121-9.

Goldman-Eisler, F. (1968) Psycholinguistics: Experiments in spontaneous speech. London: Academic Press.

_____ (1972) "Pauses, clauses and sentences". Language and Speech. 15, 103-113.

Hill, L.A. (1956) "Some notes on juncture". Le Maître Phonétique. 105, 10-13.

_____ (1957) "Stress marks and pitch marks". Le Maître Phonétique. 108, 32-5.

_____ (1960) "Stress, pitch and prominence". Le Maître Phonétique. 114, 22-4.

_____ (1965) Stress and intonation step by step. Workbook Companion. London: Oxford University Press.

Jassem, W. (1952b) "The Intonation of Conversational English". Travaux de la Société des Sciences et des Lettres. Seria A, no. 45, Warsaw.

Jespersen, O. "Sex and gender". Chapter 17 in The Philosophy of grammar. New York: W.W. Norton, 226-243.

Jones, C.M. (1971) "Diagnostic implications of acoustic cry features". Journal of Communication Disorders. 4, 310-16.

Kingdon, R. (1939) "Tonetic stress marks for English". Le Maître Phonétique. 68, 60-4.

Mulcaster (1582) cited in Key, M.R. (1975) Male/female language. New Jersey: Metuchen, The Scarecrow Press, Inc.

O'Connor, J.D. (1952) "Phonetic aspects of the spoken pun, qualitative and prosodic". English Studies. 33, 116-24.

_____ (1955) "The intonation of tag-questions in English". English Studies. 36, 97-105.

_____ (1957a) "The fall-rise tone in English". Moderna Språk. Saltsjö-Duvnas.

Paivio A., Baldwin A.L. and Berger S.M. (1961) "Measurement of children's sensitivity to audiences". Child Development. 32, 721.

Raymond, G.L. (1910). The orator's manual. 15th Ed. London: Putnam's Sons.

Sapir, E. (1915) "Abnormal types of speech in Nootka". Reprinted in David, G. Mandelbaum Ed., (1968). Selected Writings of Edward Sapir in language, culture and personality. Berkeley: University of California Press, 179-96.

Statistical Package for the Social Sciences, Update (1979) New York: McGraw-Hill Book Company.

Trager, G.L. (1949) "The field of Linguistics" Studies in Linguistics, occasional papers. I. Norman, Oklahoma: Battenburg Press.

Winitz, H. (1960) "Spectrographic Analysis of infant vowels". Journal of Genetic Psychology. 96, 171-81.